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Part I

Papers from the Proceedings of the Society of Directors of Physical Education for Men in Colleges and Universities

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Responsibility of the College Director for the Physical Examination

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THE problem of the physical educator directing a department is an intensely pragmatic one. It should also be one of research. His duty will be to establish a curriculum of varied activities and to decide who shall participate in each of these. To succeed in this task, it will be necessary for him to place square pegs in square holes and round ones in round holes. As an executive he may not be able to carry out all the work himself. This is, of course, an age of specialization; nevertheless, as pilot he should be well-grounded in certain fundamentals so that he may pick a staff to carry out his program.

Our purpose is to discuss: (1) who shall carry out such a program; (2) of what does the task consist; (3) what sort of education is necessary to qualify a candidate for this given responsibility.

It is imperative to make a sharp distinction at the outset between a medical examination and a physical examination. The former deals with not only the findings recorded, but considers etiology (causation), physiology, pathology, gross, chemical and microscopical, prognosis, immediate and remote, and a host of other things. The qualified physician should be responsible for this duty. The physical examination, on the other hand, can be done by anyone of intelligence who has had the benefit of certain training and who is in possession of the various natural senses of hearing, smell, and so forth.

A person does not need necessarily the medical degree in order to carry out a useful and workable physical examination. This is especially true from the physical educator's standpoint, since he is supposedly dealing with persons who are safe within so-called normal deviations. For his purpose, therefore, it is necessary to have an instrument of elimination with which he may sift out people varying beyond certain established boundaries. Such individuals will be candidates for special exercises, perhaps under medical supervision, and may not therefore be considered further in the present paper.

There will be no attempt made here to outline a model physical examination. Such can be compiled from numerous text books and any college director is too conversant with a variety of forms for us to deal with this subject under our present topic. We will consider merely some of the important items which should be recorded in any examination of an individual.

It may be taken as an axiom that any physical survey is an attempt to estimate capacity, individual differences, and abnormal deviations which are either actually present or, what is more important, which may be potential. The individual must always be considered as a mosaic, an assemblage of various parts, some good, some bad. It is our task to pick out capacities and weak links. The individual must be judged upon various levels and Professor Jay B. Nash has suggested one of the best working schemes for this purpose. He views the human organism as a mechanism, operating upon four levels: (1) The muscular; (2) The neuro-muscular or mentimotor; (3) The adaptive, integrative or interpretative; and finally (4) the emotional. If we analyze these categories it is seen that the first determines organic power and capacity; the second the ability to use power smoothly in skilled acts of speed and precision; the third, the potentiality of putting the first two together in life situations so that they will be useful; and the last the action and interaction of all upon the inner satisfactions and longings which go to make up emotional balance or imbalance and adjustment or maladjustment. The writer feels that any physical examination should endeavor to classify each candidate as to his equipment upon each of these four levels.

Having taken this first step, perhaps the next item of importance which must be considered is the type of body structure. Humans may be divided into asthenic, or long-slims, sthenic, or short-thicks, and the normals which are on the whole about half way between these two extremes. The asthenics have tapering necks, a tendency to sloping shoulders, shallow chests, loose-knit muscles and pendulous abdomens. Their vital organs are more delicately constructed than the normal. Their hearts are smaller, thinner walled and more unstable; their blood vessels are more delicate, thinner walled and subject to variability in circulatory control. Their stomachs and intestines are likewise thinner walled and therefore subject to weaknesses producing constipation, sagging and many other dysfunctions. The digestive juices are apt to be inadequate in supply. Their nervous systems, both voluntary and involuntary, are sensitively adjusted and easily upset. They are susceptible to diseases of the digestive tract, to pulmonary troubles and to low blood pressure. Mentally, they are highly sensitive and tend to be introverts. They are unusually susceptible to praise and blame. These are the problem individuals in physical education. They are, however, precisely the ones standing most in need of a thorough and well-grounded discipline in this field.

It is important, thus, for us to recognize that in identifying an individual as belonging externally to this group we are at the same time classifying him as to his inner qualifications. It is obvious that such people will often be found wanting upon the first, second, and fourth levels suggested by Professor Nash and that if we wish to

aid them we must keep in mind their physiological handicaps and recognize that to pit them against individuals more fortunately equipped, especially if they have not been properly trained, would be a grave mistake.

The sthenic type is precisely the opposite of the above in all particulars. He is the "John Bull" in our midst. He is short-necked, thick chested, long bodied and short limbed. He has a powerful, thick walled heart, thick walled blood vessels, well muscled intestinal tract, plenty of digestive juices, and a more stable voluntary and involuntary nervous system. Mentally he is extroverted, exuberant, and sanguine. He tends to take responsibility lightly and to blame the other fellow. In later life he is liable to obesity, high blood pressure and kidney disorders. In youth and early adult-hood, he is not usually a problem case to us in physical education.

The normal individual is a combination, as we have said, of these two types and does not need to be considered further under this heading.

Under structure, another category in our classification should be determined, namely, the endocrine or ductless gland balance. If a person has an abnormal functioning in this sphere, especially before adolescence, certain definite changes in bodily contour may result. Thus, if the pituitary gland is overacting before puberty we get a symmetrical giant, or if the sex glands are underacting, we may get a giant who has the ridiculously small body perched on top of two stilt-like legs.

On the other hand, if the sex glands are over-acting, the ephiphyses of the long bones will disappear too early and growth may be stunted. An underacting pituitary produces long delicate tapering fingers of the type pictured in advertisements featuring nail polishes. An overacting thyroid produces a hand of the same general contour, but which manifests the characteristic tremor. It is not our purpose to dilate further upon the minutiae of endocrine diagnosis. Suffice it to say that the important deviations in this field may be recognized by relatively apparent changes in bodily contour.

Many other more delicate structural deviations could be cited. Enough, however, has been touched upon to illustrate the point which is, that once having seen examples of each case type, a physical educator could be taught to recognize these again when meeting them in his work and he could also be taught to evaluate each type in respect to an activity program.

Having classified an individual structurally, the next problem is to determine his behavior reactions. What kind of a person is he mentally, nervously, and emotionally? What grade of intelligence are we dealing with? Is the candidate sensitive or tough-minded, introverted or extroverted, or is he a mixture of each? Is he suspicious and

secretive (the paranoid type)? Is he volatile or melancholy, or does he alternate more or less between these two polls (the cyclo-thmic or manic depressive type)? Does he show a tendency to escape too easily into a phantasy dream world when reality presses too hard? Does he, for example, sulk, go off by himself, and play make-believe (the dementia praecox type)? Each one of these classes are common enough and can be often recognized in early life. The physical educator, who is having so much to do in influencing the lives of others, should know something about these conditions. It will give him increased power to do his job well and will save him from making grave errors in program construction and in matters of administration.

But this is not all. He should also estimate whether a person falls into the so-called functional neurosis group. Is the candidate a chronic complainer who "enjoys ill health" and loves to relate symptoms of various somatic organs? Is he, in other words "neurasthenic" minded? Or is he the type who is beset by a thousand fears in reference to what seem to be imagined symptoms? Is he psycho-neurotic minded? Again, is the candidate hyper-suggestible, does he sleep walk or have peculiar body numbness? Is he, in short, hysteric-minded? Border line cases may be difficult to judge but those who are important from the physical education standpoint can be recognized by any intelligent individual who has been trained in what to look for. To have failed in identifying such people who come into our care is to lay ourselves open to grave and unnecessary error.

There are still further problems in this connection. It is, for example, of the utmost importance to ascertain whether the candidate has symmetrically matured. Too often, emotional development lags far behind the chronological and the mental. The spectacle in our modern life of even highly intelligent people who have never progressed into real maturity, is to say the least, alarming. Growing up is a hard task. It takes courage and proper training. If our candidate loses his temper, believes the world owes him a living, is crushed under disappointment, assumes a blasé attitude, affects indifference, has crushes or has been arrested sexually so that he or she practices excessive masturbation or has homosexual trends, then we are dealing with immaturity and the remedy is not sermonizing, eloquent tirades on what is right and wrong, or threatening with dire punishment. The only remedy that will work is education and emotional development, and provided the physical educator understands the dynamics underlying such conditions, he is in a position to offer a program best suited to get constructive results. Physical education teaches how to play the game and how to take losses, it teaches life and how to handle failure with poise. These are the instruments which foster maturity. But the physical educator must know what kind of clay

he is working with, in order to vary his method, otherwise he may miss the mark and do actual harm. People in this immature group are the ones who are responsible for much of the world's suffering. Many of them could be redeemed in early life. Our responsibility here is tremendous.

Proceeding now to another important section which will loom large in any significant physical examination, we come to the chemical balances of the body. First, under this heading are the already-mentioned endocrine glands, which secrete substances of the utmost physiological importance. For example, a thyroid which is over-acting produces hyper-stimulation of the voluntary and involuntary nervous systems, with a result that reaction time will be irregular and premature. The same general effect is observed in underacting parathyroids, only here we have the added disturbances in calcium metabolism with the resultant tendency to spasms and cramps in various muscle groups.

Acting similarly in respect to disturbed function, are the adrenal glands with their dynamic effect upon the sympathetic nervous system, producing emotional instability tending toward unwarranted fear or anger, toward tremors and spasmodic, jerky muscular action with an over accumulation of sugar in the blood. Then there is the condition of under-action of thyroid and adrenal, producing retarded neuromuscular response, slowing down thinking, dulling of sensory reception, weakness and easy fatigability. What athlete or citizen can do efficient work with a muscular system which "goes off," so to speak, before he wills it to, or which does not respond promptly when he desires action? How can one hope for clear thinking if body chemistry determines a chaos within us arising out of discord upon each of Professor Nash's four levels? Quite apparently talk or "hoping for the best" or any other sort of Pollyannaism will not afford a solution to the problem. It is then important for us to recognize such states, many of which can be properly remedied, by appropriate measures. One does not need a medical degree to identify these cases. It is only necessary to have seen a few of each before. The borderline and difficult instances need not concern us vitally. These are in the medical province. We must continually hold in mind that our problem is one of eliminating the unfit for general activity, and of placing mild deviates from the normal into properly modified activity programs.

There are many other imbalances in body chemistry which are important to recognize. Outstanding among these are body poisonings or toxemias from bacterial infection. Unexplained anaemia, sensations of fatigue, aches, pains, depression or inflammation are sign posts that help us here. Obviously infected, red, large or sore tonsils, abscessed teeth and sinus infection are sources of much menace and

should be removed before a heavy activity program is permitted. The recognition of such foci is not an occult or mystic task.

Other chemical imbalances are anaphylactic states due to improper protein metabolism and which predispose to hives, "hay fever" and asthema. Then there is the so-called "auto-intoxication" group arising out of intestinal dysfunction, such as a catarrhal colon. These people not only present local symptoms such as gas and a sense of discomfort or weight in the abdomen, but are also handicapped by mental depression, lack of ambition, skin disorders and many other symptoms.

Making a positive medical diagnosis in any of these cases requires technical assistance, but suspecting that such imbalances are present can be accomplished by any intelligent and properly trained physical educator. It is apparent that the man or woman who is despondent because of emotional immaturity, conflict or maladjustment does not need the same handling as if he or she were suffering merely from the absorption of poisons from the lower bowel. In working out our programs we must be cognizant of such differences.

Having obtained data of the type outlined above, it is important to get a careful history in the case of each individual. This need not impose a great burden on the examiner since he can use self- answering forms, where the student merely records "yes" or "no" to a long and appropriately selected series of questions. A proper history will be of tremendous use in estimating the importance of certain findings. Thus if a person has had a history of growing pains, chorea, stiff neck, tonsilitis, and inflamed joints, all of which are various manifestations of rheumatic infection, and also has a history of a heart murmur which may or may not be present at the given survey, he should be regarded as a potential cardiac and all infection should be removed. Furthermore, activity in such people should be guarded on the more strenuous levels until careful supervision establishes the fact of a normal circulation. It is such a case who requires medical cooperation if there is any doubt whatsoever. On the other hand, a heart murmur in systolic time at the base over the pulmonary valve and in the absence of any cardiac or rheumatic history may be totally disregarded.

The history should further consider developmental episodes, heredity, personal habits, past infection, accidents and environmental background. It should attempt to get an idea of the mental and emotional status. Properly used, it is one of the greatest possible protections and adjuncts to the physical examination.

As a part of every physical examination there are certain measures the carrying out of which requires special although not difficult training. In this group fall blood pressure reading, urine analysis, spirometer estimations, tests for anemia, et cetera. Then there are various functional tests such as the Schneider and Rogers tech-

niques, and also the intellectual quotient estimations and others in this class. More difficult is the use of the stethoscope in cardiac and lung examinations, metabolism estimation, and X-ray interpretations.

Practically, however, and for the purposes already defined as applying to the special problems of the physical educator, all of these examinations may be done by properly trained non-medical individuals. Heart murmurs are a matter of timing and good ears, rales in the chest are the same; the blood pressure estimation is not a skull-splitting procedure nor are any of the other tests provided the examiner knows the technique and has had proper training in how to interpret the data.

All of which brings us to the question: Where shall the physical educator get his training and of what must it consist? First, he should have a very real foundation in the sciences of anatomy, physiology, and chemistry, especially physiological and organic. He should be trained in psychology and sociology. He should have had a survey of genetics and should be well grounded in biology. The courses taken covering these fields do not need to be as extensive as those prescribed for the physician, but they should offer him an understanding of the fundamentals.

It is our firm belief that every physical educator should have had an opportunity to see clinical material, and it is to be hoped that the time may come when medical and physical education students will have certain courses in common. Much would be gained from such an arrangement. Mutual understanding would develop and feelings of distrust on both sides would disappear. The two professions are not rivals. They should reinforce each other at every point.

The physical educator should have a knowledge of statistics. There is too much mere opinion in every walk of life and in a young profession this hydra-headed monster—Opinion—can strike at our very heart's blood. We want facts and statistics will discover these. Our records, derived from the type of physical examination indicated and compared to findings obtained from other sources, will speak for themselves over a period of years. What we will have done about it will also be tabulated, balanced by a history of the results obtained. Every new profession must go through an evolution. The proper use of statistics, enriched by plentiful data, will hasten this evolution and will commend us much sooner to a now more or less doubting or only half understanding public. This, of course, is necessary because we want the best in our specialty.

At present we are working under the handicap of improper rewards for services rendered. Physical educators are over worked and under paid. The salaries at the top are pitifully inadequate. We must show the public that our contribution is vitally necessary and in doing

so we will have taken the first step toward the attainment of more adequate compensation.

To quote Professor Nash once more, our profession deals not only with health acquisition but in the attainment of joy. Once people understand this we will begin to come into our own. It is unfortunate that we are known as "physical" educators. The emphasis upon the first word is too forceful and is misleading. Physical education is *Life* education. If we forget this we have imposed a narrow horizon upon our own thinking and our contribution will suffer accordingly. It is too late probably to change the title. It has stood too many years. What we can do, however, is teach the public and especially our students the true meaning of this word "physical." The mind and the body are so closely inter-dependent that it is difficult to clearly decide where one leaves off and the other begins. There can be no full expression of the one where the other is meagerly equipped.

The special problem of the college director who is burdened with responsibilities but who wishes to brush up upon certain aspects of a program of the type herein suggested, is one of the greatest importance. We need very sorely in our summer schools in physical education brief and intensive courses of a practical and largely clinical nature. These should be supplemented by extensive reading lists which may be read afterward and they should be adapted to the specific problems encountered in such a college physical educator's life. Much can be obtained from reading. Seeing with the eye of the mind, knowing what to look for and how to see it—this is half the battle.

This paper has been merely a survey, a dealing in ideas. It does not in any sense pretend to be complete and it has touched upon so many topics that all have been slighted in varying degrees. The chief aim has been to stress certain high-lights of a very wide and complex subject. It is the future of physical education which should command our greatest interest and receive our best effort. We know too well its past and present limitations.

In summarizing, the below listed considerations will bear repetition and further thought:

1. The absolute necessity of adequate training.
2. Over confidence is fatal.
3. Part knowledge is dangerous unless applied with caution and humility.
4. Granted intelligence, it is possible to learn anything by honest application under qualified guidance.
5. A start must be made and the pioneers' burden is both dangerous and heavy.
6. The need of new and properly planned educational opportunities for physical educators where they may qualify themselves as may be necessary.
7. The need of scientific and exact data.

8. The analysis of the material by statistical method to obtain facts.
9. The importance of maintaining a critical attitude toward mere opinion no matter how "authoritative."
10. The need of perfect mutual confidence and exchange of view points between the medical profession and ourselves.
11. The recognition that all *good* doctors are interested in keeping the public well and are not consumed by petty jealousies.
12. The necessity that physical educators understand the criteria which will enable them to select and recognize who are the good doctors.
13. The appreciation that the training of athletes is properly only one of our incidental tasks. That it is probably the least important one of all.
14. That our job is to aid in the program of preventive medicine.
15. That above this, our job is to teach people how to live more abundantly, efficiently, economically and with the assurance of attaining the maximum of possible joy.

The responsibility placed upon the shoulders of any physical educator is tremendous, but that confronting the executive is a little terrifying. In a very real sense, such individuals are shaping the destinies of the future for they are dealing with more or less plastic human beings. Their laboratories are the sport field, the gymnasium and the place of contest. They are molding ideas, new standards of values, the materials for a better world. The modesty, courage and seriousness of those in whose hands rest this great but thrilling challenge has been a source of inspiration to the writer. Any service which this new profession may be able to contribute to the magnificent goals shining on the horizon, already outlined against the future and growing rapidly toward the realization of the present, must afford us the most extreme satisfaction. It seems worth while to carry on the torch and to that end we will work with heart and mind in order that others may find the world a better place to live in.

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Report of the Committee on College Entrance Credits

As a result of Dr. Clifford Brownell's paper and suggestions, before the Society a year ago, there was appointed a committee to study what was being done and what might be done in securing entrance credit for physical education in colleges and universities.

Early in the spring the committee held a meeting enroute to Cleveland, and it was decided that the best results would be secured by having some graduate student, working for his Ph.D. or M.A. degree, make such a study the basis for his thesis and place the support of the Society of Directors back of him, in much the same way that we did with Dr. Scott's investigation; "A Personnel Study of Directors of Physical Education for men in Colleges and Universities." Dr. J. F. Williams, who is a member of the committee, hoped to find one of the graduate students at Teachers College interested in this problem. This is still our plan although he was not able this fall to find the person to undertake the study.

However, the committee felt that it might be of interest to report what is being done at the present time in some states to set up certain standards of work in physical education which will make a certain amount of credit acceptable in certain State universities and colleges.

In this connection it will be interesting to note that the Society of State Directors of Health and Physical Education have a committee, headed by Major E. V. Graves of Virginia, working on this same problem.

The first step which seemed necessary in the securing of college entrance credit was to have the states through their State Directors set up standards for Physical and Health Education credit which the universities and colleges would consider satisfactory. It is of interest to know that this is being done and at least two states have set up such standards.

What has been done? The state of Florida has been one of the first states to set up such standards, and we believe it will be of interest to report on what is being done in this state.

Florida has set up certain standards which the State Supervisor is to use in approving high school physical and health education programs, in order that high school graduates may receive one unit entrance credit in Physical Education at the University of Florida and Florida State College for Women. Not more than one-quarter of this unit may be earned in one year. If a student meets all requirements

for two years, one-half unit of credit will be allowed for entrance to these institutions. Not less than one-half unit credit in physical and health education will be recognized for entrance. This standard does not affect the standardization and accrediting of the high school.

It is designed in keeping with recommendations of the educational survey to give a higher goal towards which our better schools may strive. This plan is used as an incentive to have provided for the children in various communities facilities and leadership that will make a larger contribution towards the promotion of a better physical and health education program. It is an endeavor to make physical and health education more educational and to contribute some part in making education more vital and dynamic to the Florida boy and girl.

In order that this privilege of entrance credit unit may not be denied in future years, it is important that our standards be high and not too many schools allowed to give entrance credit. Since we are, in a sense, on trial we must make good in causing this unit to measure up in a favorable comparison to other units.

The following requirements have been set up for high schools:

1. *Time Allotment*

Minimum of 3 regular class periods per week. A regular class period may not be less than 45 minutes. It is urged that the pupil be given the opportunity for a daily class period.

2. *Training of the Physical and Health Education Teacher*

The teacher of the boys must have had training in physical and health education of equal rank in content and time to the physical and health education major course at the University of Florida.

In conference with Dr. Joseph Roemer and Dean J. W. Norman, University of Florida, the following plan regarding the training of teachers has been agreed upon:

18 semester hours for college entrance credit 1929-30
24 semester hours for college entrance credit 1930-31
30 semester hours for college entrance credit 1931-32
36 semester hours for college entrance credit 1932 and thereafter

The teacher of the girls must meet similar conditions regarding the physical and health education major at the Florida State College for Women.

3. *Facilities*

(a) Sport Fields and Play Courts (exclusive of lawns and buildings). There must be sufficient space for both girls and boys to play their respective games at the same time. This is particularly important because of the growing demand and increasing use of the after-school hours for the intramural program. Size of space and number of fields depends on school enrollment and the type of games to be played. Since both junior and senior high school games are of the athletic type, the space must be ample and safe. Space for sports fields and play courts should be:

Sr. H. S.—10-15 acres
Jr. H. S.— 5- 8 acres

The above requirements as to space must be provided for in all new sites. The survey recommendations are: 5 acres for elementary school, 10 acres for

junior high school, and 20 acres for senior high school. In order to meet conditions that cannot be altered at present, the State Supervisor of Physical and Health Education may accept a minimum of five acres for a senior high school and three acres for a junior high school, provided a space is so arranged that intensive use can be made of the layout. Similar provision can be made for schools that have neighboring space that may be obtained for school purposes. The lower limit of five acres for senior high schools and three acres for junior high schools will be accepted for these schools until the year 1932.

(b) *Gymnasium*—A gymnasium is necessary in order that: (1) The Physical Education program may be centralized; (2) The health of the teacher and the pupils in physical education classes may not be endangered in weather that is too hot, too cold, too windy; (3) Physical education classes may not be dismissed because of unfavorable weather conditions, thereby causing the pupils to miss training and instruction, and causing an upset of the routine of the school; (4) Certain elements of physical education that cannot be taught outdoors can be offered to the pupils. The above statements are made because of propaganda from certain groups that gymnasiums are not needed in Florida.

The gymnasium should be the open-air style with factory type windows to be closed when necessary. In order to accommodate many classes, it is a question of number of gyms—rather than size. The question of accommodation of spectators is secondary when economy is essential.

(c) *Locker Rooms and Lockers*—Sufficient room to provide for safekeeping of gymnasium suits, clothing, towels, and to provide sanitary and adequate dressing space for the largest classes, or groups, must be provided. Sufficient number of lockers for the school enrollment, or enough lockers for the largest classes, or groups, with wire baskets enough for all pupils. Provision must be made for laundry of both towels and gymnasium suits.

(d) *Shower Room and Showers*—Enough room and showers to accommodate the largest classes, or groups, in at least two or three relays. For the girls it may be best to have four dressing booths around each shower.

(e) *Equipment*—Equipment should include the accepted types of apparatus for use in teaching technic and the fundamental skills and for giving stunts and self-testing activities. Play equipment of the more permanent nature should be included. This equipment should be sufficient to accommodate the largest classes or groups.

(f) *Physical Education Supplies*—Such items as balls, bats, nets, etc. that are used up, or wear out rapidly with use, should be supplied on the same basis as laboratory supplies. A supply of these items must be sufficient to meet the needs of the largest classes, or groups.

(g) *Pool*—Because there is such an abundant opportunity for aquatics in Florida as a leisure time activity, it is recommended that where possible, provision be made for teaching and training the pupils in aquatics, such as swimming, diving and life-saving. These pools must be safe and sanitary and provision made for their operation. The outdoor type can be constructed more economically and may serve very satisfactorily.

4. *Program*

A natural program of physical and health education is most desirable. The program must include all pupils enrolled. Regularly scheduled classes must be provided. Forty pupils is about the right number for a class. Special and corrective classes should be limited to about fifteen pupils.

Instruction in the following phases of the program should be offered: (1) play, athletics, games, aquatics; (2) rhythms and dramatic activities—festival, demonstrations and pageants; (3) self-testing activities—stunts, achievement tests; (4) fundamental skills—running, jumping, climbing, throw-

ing, hanging, lifting, carrying; (5) sports and camping activities—boating, hiking, camping, trailing, fishing, archery; (6) social service activities—clubs, boy and girl scouts, entertainment, parties.

5. *Classification of Pupils*

In order that the interests and needs of pupils may be met, they should be classified according to their physical abilities. The "dub" should not be allowed to retard the more "skillful" student and spoil the joy of competition and participation, nor should the "skillful" pupil cause the "dub" to assume the "hopeless complex." The young and small should not be placed with the old and large. A classification according to grade level will be of some advantage. This can be done without much difficulty, if each pupil arranges for physical education class first. Because there is usually only one unit of locker rooms and gymnasiums for all pupils each pupil should register for physical education class first, and then arrange other classes.

A year ago Ohio, under the leadership of its State Director, Dr. Clifford Brownell, started to draw up standards for Ohio. Mr. O. C. Bird, Director of Physical Education at Ohio University, secured the approval of their administration to accept high school physical education credit from high schools properly accredited by the State Department of Education. Mr. Bird, in a letter received recently states "I cannot give you any results from our experiment with high school entrance credits because we are just getting ready to go." He does not state how much credit Ohio University expects to give and this would be interesting to know. Probably it is either one-half unit or one full unit.

Dr. Delbert Oberteuffer, present State Supervisor of Health and Physical Education in Ohio, has taken up the work started last year, and has set up minimum standards for approved secondary school programs in health and physical education. With these standards it will be possible for the State Department to accredit certain schools that are meeting these standards and the next step will be up to the universities and colleges to follow the example of Ohio University in giving college entrance credit to those schools that are on this accredited list. The following are the standards set up by Dr. Oberteuffer for the State of Ohio:

1. *Time Allotment*

Minimum of 3 regular class periods per week for grades 9 and 10; two per week for grades 11 and 12. Total minutes per week for any pupil shall not be less than 100.

2. *Training of Teachers*

(a) All teachers of health and physical education shall be certificated in physical and health education by the State Department of Education.

(b) After 1931, all special teachers, i.e., those teaching only health and physical education must have completed a four year college or University course including the requirement of a major course of 40 semester hours in health and physical education as prescribed by the State Department of Education.

3. *Facilities and Equipment*

(a) All high schools must be equipped with a gymnasium.

(b) A minimum play space of 5 acres for senior high school and 3 for a junior high school. Because of unalterable conditions in certain schools, the State Department will, on occasion, waive this standard.

(c) Locker rooms and lockers of such type and quality as to offer a safeguard of personal property and to provide sanitary and adequate dressing space for all classes.

(d) Bathing facilities (showers) in sufficient numbers for the largest classes, with hot water, soap, and towels available during the school day.

4. *Program*

(a) A year-round required program for all pupils, the content of such program to meet the approval of the division of Health and Physical Education of the State Department of Education.

(b) Health instruction given one period per week for at least one term a year throughout the four grades to all pupils.

(c) A physical examination of all pupils at least once during the four years, and an annual examination of all pupils representing the school in interscholastic athletics.

(d) Any school represented by teams in interscholastic athletics must be a member in good standing of the Ohio High School Athletic Association.

5. *Credits*

Opportunity given to earn not less than one-half unit in health and physical education in four years and preferably one full unit of credit granted for successful completion of the four year course, such credit to be a requirement for graduation for all pupils.

With the State Directors interested in this problem and considering it sound educational procedure, and with the members of the Society of Directors backing them up by asking the administration to grant such credit when proper standards are met, the next five years should see great progress made in standardizing our secondary school work to meet certain minimum standards, and in acceptance on the part of universities and colleges of entrance credit from those schools that meet these standards. It will be a tremendous stimulus to schools in improving the quality of their work when they find that certain schools have their physical education credit accepted by universities and colleges in the state while certain others do not.

The committee makes the following two recommendations:

First—That a study of this problem be undertaken by a graduate student to be selected by the Committee, with the backing of the Society.

Second—That the Committee of the Society of Directors join with the Committee of the State Directors, and that the two co-operate in working out this problem.

J. H. NICHOLS, *Chairman*
JESSE F. WILLIAMS
GEORGE L. RIDER

Report of the Committee on Curriculum Research

INTRODUCTION

This report represents the second year of work of the special committee appointed at the annual meeting of the Society in December, 1927. The committee was appointed for the purpose of making a thorough study of the relative contributions made by the various elements constituting the subject matter of physical education with the ultimate objective of formulating and recommending a standardized program of physical education for colleges, to take the place of the present hit and miss program so largely in vogue.

Because of the importance of adequate preliminary work, the scope of the committee's field was extended to include a thorough survey of the elementary and high school curriculum as well. Because of incomplete returns in this year's study on the grade schools, the present report covers only the college division. The statistics for the grade schools will be completed later and a final report filed at a future date.

Objectives of the Study

Members of the society will recall that the objectives formulated for the study last year included:

1. Formulation of a standardized set of constituent elements for a comprehensive educational program of physical activities.
2. Evaluation of these elements in relation to each other to determine the amount of time to be assigned to each one.
3. Evaluation of these elements in relation to the age of the child so as to determine grade placement of activities by grades and school divisions.
4. Selection of a minimum set of elements that should be considered essential to an all-round program of physical education.
5. Evaluation of each activity in terms of its developmental contribution to the child on the basis of:
   a. Physical or organic needs.
   b. Social or citizenship needs.
   c. Psychological needs.
   d. Safety skills.
   e. Recreation or hobby skills.
   f. The correction of physical defects.

Procedure and Results of Last Year's Study

In conducting the first year's study, rating charts were sent to a selected group of 75 experts, composed chiefly of college directors,

state supervisors and some large city supervisors. Approximately 50 per cent returned the charts, hence the study was based on estimates of forty men. It was assumed that the opinions of a few outstanding leaders would be better than a large mass of opinions from poorly trained people.

Each rater evaluated each activity as to its placement in all grades from the first through the 16th.

On the conclusion of the study, the committee found that most of the activities listed were not suitable for use in the lower grades of elementary school and that the value of most of them increased consistently up to and through high school and college. Most of the activities had very little contribution to make to the correction of physical defects. Swimming easily topped the entire list in all round contribution with a median score of 10.

Concluding the last year's report, the committee suggested it would be unwise to give undue emphasis to the conclusions of the study to date since they represented merely the concensus of opinion of a group of administrators on the basis of subjective judgment. The committee asked that the report be considered preliminary and that it be continued for further study. This request was approved by the Society and the committee has continued the work this year on a more elaborate scale.

Procedure Followed This Year

In order to secure helpful advice, the chairman circularized the entire membership of the society with a questionnaire covering suggestions for the continuance of the research. Unfortunately a relatively small number were returned. Many of these contained valuable suggestions which have been incorporated in the present study. Many other suggestions recommended the use of some objective procedures which seem to be impracticable under present school conditions. The chairman also conferred personally with many leaders, getting suggestions on changes in the procedure and in the elements to be included.

After careful consideration of possible procedures, the following plan was decided upon:

1. It was thought best to confine the study strictly to the boy's program.
2. To evaluate activities only from the standpoint of their use in class instruction and as recreational activities for all students rather than in terms of use for representative school teams.
3. By certain combinations and the elimination of some activities the list was reduced from 37 to 30, also an additional division, Rhythmics, was added, giving a total of six main divisions; namely, Aquatics, Defense or Combative, Gymnastic, Individual Sports, Rhythmics, and Team Games. In addition the corrective evaluation was discarded as it had scored very low in the study.

4. A radical change in procedure was made as to the selection of raters. It was decided in conformity with the suggestions of a number of critics that a better evaluation as to grade adaptation would be secured from supervisors directly in touch with the grades being considered. Accordingly, the following plan was adopted:

   The state supervisor in each of nineteen states was asked to select one outstanding specialist in his state for each school grade. In addition, twelve prominent city supervisors in other states were asked to do the same thing. Each state and city supervisor was then asked to serve as a clearing house for his section and to pass on and to return the rating charts for each of these selected specialists. This gave 31 groups, each consisting of twelve specialists, totalling 372 raters in all, or 31 for each grade, beginning with the first and up through the twelfth. A complete set of rating charts with detailed instructions was sent to each one selected through the office of the state or city supervisor.

   Similar rating charts were sent to each of the 125 members of the College Directors' Society, with the request that each evaluate the activities on the list, from the standpoint of their contribution to the college program alone. This gave a grand total of approximately 500 rating charts distributed, each to an outstanding leader in his school division.

   Of course, these have met the usual fate of questionnaires and up to date about 50 per cent of the raters in each of the public school grades have returned their charts, making an average of 15 per grade. We are still hopeful that the entire number may be returned, hence the tabulation of statistics on the grades and high school is being held up until a more complete set of returns can be secured. The state supervisors have been very cordial in their co-operation which involved considerable clerical work on their part in transmitting and returning the forms. Since there seems to be good possibility of securing most of them, it was deemed wisest to postpone the tabulation so as to give a more representative picture of the findings. This will be included in a supplementary report to be completed later.

   The members of the college group have been slow in returning the charts, hence it was necessary to base the present statistical study on incomplete returns of approximately 32 per cent. An even 40 charts were returned in the college division. This would seem an inadequate number, except for the reason that they constitute a very representative group of leaders. It, therefore, seemed worth while to formulate a report on that basis rather than to leave the study incomplete for the year.

   The data herewith presented, therefore, is a picture of the combined opinions of 40 prominent members of the Society of Directors of Physical Education in Colleges. It deals only with the program as adapted to college age students.

SCORING BASIS FOR EVALUATION

All raters were sent a detailed set of instructions on how to score the charts. As of last year, the scoring was done on an evaluation range of 0-10, 0 representing no contribution, 10, maximum contribution. Each rater was to evaluate the activity only as to its contri-

bution to his particular grade. The rating chart, (Chart 1), provided for seven distinct evaluations:—

1. The contribution to the physical and organic growth and development of the child and the improvement of body function and body stability.
2. The contribution to the traits and qualities that go to make up the good citizen and the development of sound social and moral ideals through intensive participation under proper leadership.
3. The contribution of the activity to the psychological development of the child including satisfactions resulting from stimulating experiences physically and socially.
4. The contribution to the development of skills that increase the individuals capacity for protection in emergencies, both in handling one's self and in assisting others.
5. The contribution to the development of skills that have a distinct function as hobbies for leisure time hours, both during school and in after school life.

Two additional columns were placed on the chart, the first one calling for an evaluation of each activity in terms of its all-round contribution, listing as number 10, one-third of the activities which would seem to be capable of making the greatest contribution and which should constitute a minimum program for the grade. The middle one-third in importance were to be scored as number 5, the lowest third as number 1. The second column provided for a percentage evaluation of the highest one-third of the activities, indicating the percentage of time that each should be given out of the total time for the year for the particular grade.

These two last columns were not clearly understood and as a result the scoring varied so widely on the charts that it was impossible to use the figures for statistical study. It was accordingly necessary to discard the percentage estimate. It had been hoped this would be one of the most significant parts of the study. As a substitute for the all-round evaluation, an average was taken of the median scores for each of the five main contributions. This was then called the all-round contribution.

Weaknesses in the Procedure

The committee wishes to emphasize before undertaking an interpretation of the findings that it must be kept in mind that the entire study is based on a set of purely subjective judgments or personal opinions. Obviously it is out of the question to handle personal opinions by statistical procedure and make of them objective facts. On the other hand, it is evident that the opinions of mature men of excellent training and large experience should have far greater weight in determining a program than should the immature opinions of the individual of poor training and little experience. Hence, a program

Evaluation Chart 1.
Boy's Physical Education Program

____ Grade	Physical (Organic) (Health)	Social and Moral (Citizenship)	Psychological (Intellectual)	Safety Skills (Self and Others)	Recreational Skills (Leisure Time)	All Round Contribution	Percentage Rating
I Aquatics							
1. Life-Saving							
2. Swimming and Diving							
II Combative							
3. Boxing							
4. Fencing							
5. Wrestling							
III Gymnastic							
6. Free exercises (calisthenics)							
7. Gymnastic Games and Relays							
8. Heavy Apparatus							
9. Marching							
10. Tumbling and Pyramids							
IV Individual Sports							
11. Archery							
12. Golf							
13. Handball							
14. Horseshoes (Quoits)							
15. Squash and Squash Tennis							
16. Tennis							
17. Track and Field							
V Rhythmics							
18. Gymnastic Dancing							
19. Clog and Tap Dancing							
20. Folk Dancing							
VI Team Games							
21. Modified Games (Bat Ball, etc.)							
22. Baseball							
23. Basketball							
24. Football							
25. Playground Ball							
26. Soccer							
27. Speedball							
28. Touch Football							
29. Volley Ball							
30. Water Polo							
VII Additional Activities							
31.							
32.							
33.							
34.							
35.							
36.							
37.							

based on such a composite judgment should be far more scientific than the program usually found in the average school over the country today, based as it usually is on the opinion of some poorly trained and inexperienced teacher or principal. The statistical treatment of opinions gives us merely a picture of the central tendency of the judgments of these specialists.

With this explanation it will be understood that the report does not assume to be a statistical study of the objective type but rather an effort to present a composite picture of combined judgments.

Statistical Procedures Used

In handling the statistics, the ratings for a given grade were all transferred to one chart (chart 2) under the proper contributions. Medians and middle 50 per cents were then estimated for each contribution. An average was then taken of the medians to give the all-round contribution. Averages of the upper and lower limits of the middle 50 per cent were then taken which gives the average middle 50 per cent.

After consultation with several statistical experts, it was deemed wisest to estimate only these figures rather than to attempt standard deviations. This was on the basis that the median and middle 50 per cent would give the truest picture of a series of subjective opinions.

The medians were then transferred to individual charts on the basis of each of the five major contributions, physical, social, psychological, safety, recreational. These were then made in the form of bar graphs, showing the height of the median from 0 point. The average of these medians was then transferred to an all-round contribution chart and placed in order of their all-round rank, listing as number 1, the activity having the highest all-round score.

Bar charts were made, indicating the middle 50 per cent score for each of the five contributions. A similar chart was then made, showing the average of the middle fifty per cents arranged on the basis of their median score. Both this chart and the preceding middle 50 per cent charts give a composite picture of the middle 50 per cent range, the upper 25 per cent range, lower 25 per cent range and the median, the middle 50 per cent being indicated in solid black, the median with a white space.

The third set of charts was then constructed, arranging the activities on the basis of median score rank for all-round contribution. In this chart each activity is listed, with its median rating for each contribution indicated in black bars with the all-round contribution indicated in a red bar.

A fourth set of frequency polygon charts was then constructed showing by various types of lines the relative scores of activities for the several contributions.

EVALUATION CHART 2

Boys' Physical Education Program

Grade .....

Activity .....

	Physical (Organic) (Health)	Social and Moral (Citizenship)	Psychological (Intellectual)	Safety Skills (Self and others)	Recreational Skills (Leisure time)	All Round Contribution	Percentage Rating
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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28							
29							
30							
31							
32							
33							
34							
35							

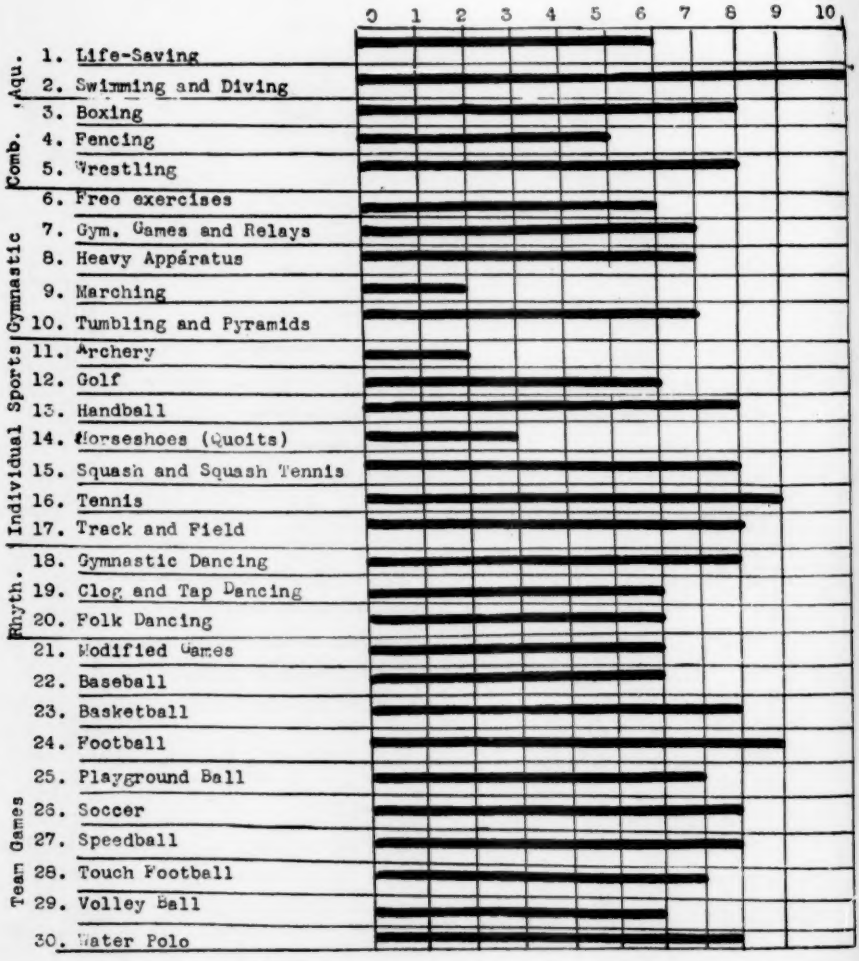
Interpretation of Charts

Chart number 3 presents the median scores of the forty raters for each activity showing its contribution to the *physical* development of the child. As might be expected, the physical contribution scores run much higher than any of the others. This may be due partly to the fact that the physical contribution seems to be more objective and

COLLEGE DIVISION

Evaluation Chart—Boy's Physical Education Program—Chart 3
Contribution to the Physical Development

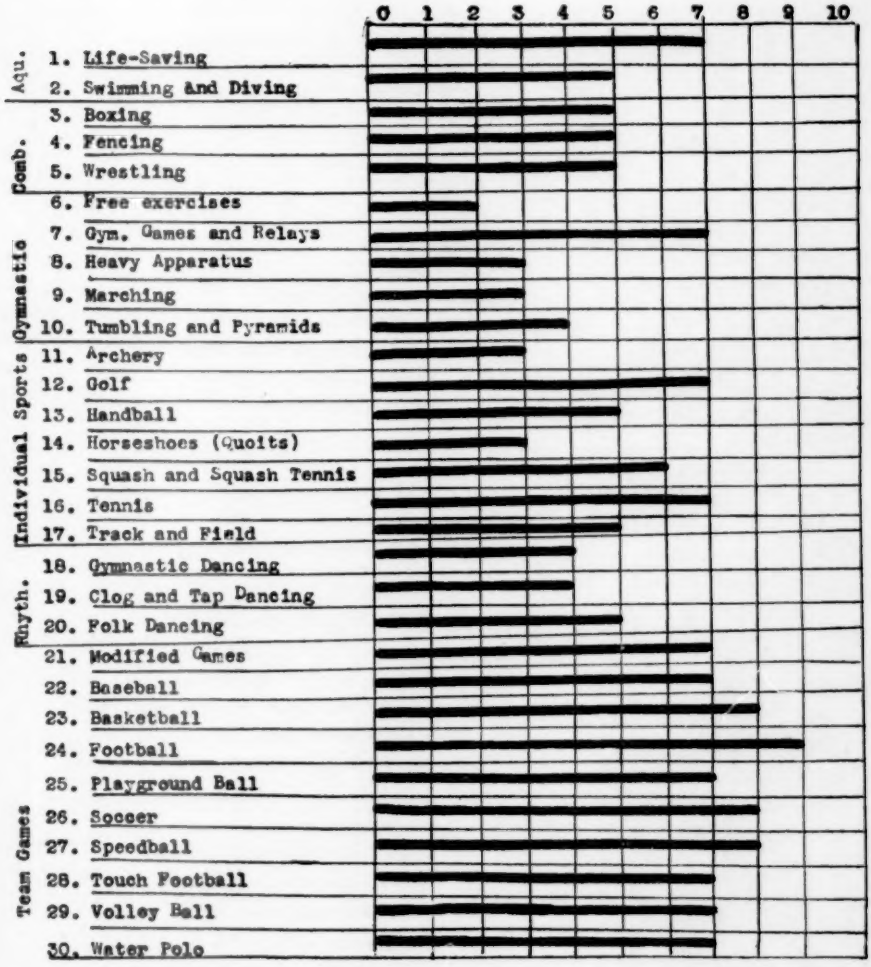
Chart shows the relative contribution of each activity on a scoring range of 0-10



COLLEGE DIVISION

Evaluation Chart—Boy's Physical Education Program—Chart 4
Contribution to the Social Development

Chart shows the relative contribution of each activity on a scoring range of 0-10

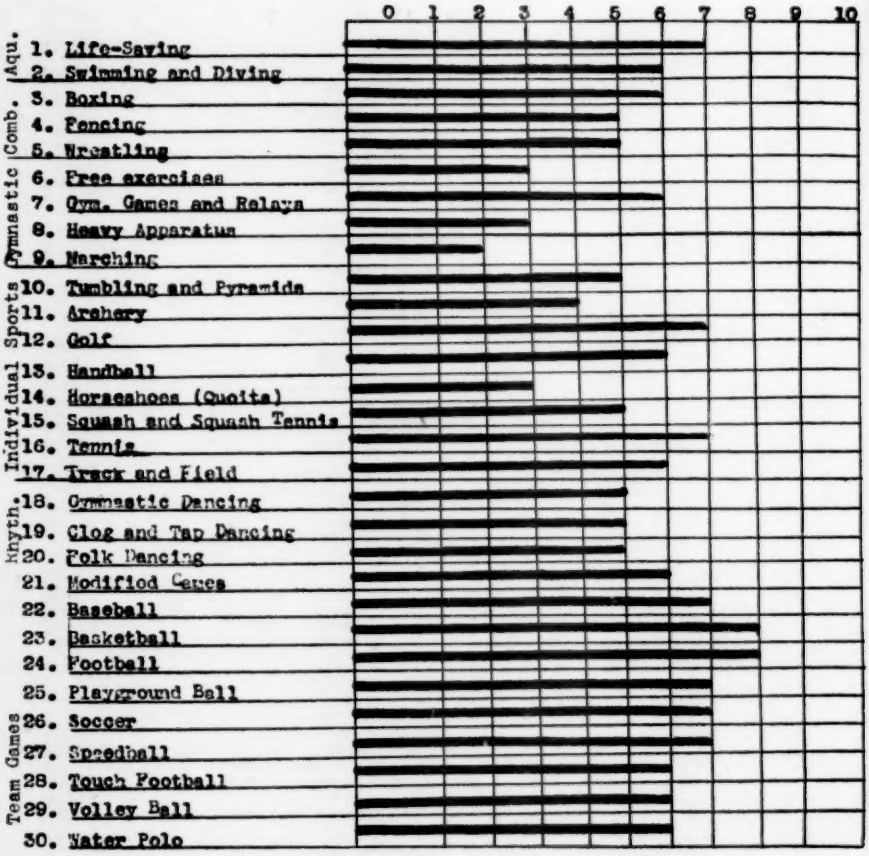


hence more easily scored. Most teachers are also accustomed to thinking of the physical contribution of their activity, hence they may feel more justified in listing high scores for it. In physical contribution, swimming and diving stands easily first with a median score of 10. Tennis and football follow closely with scores of 9. Boxing, wrestling, handball, squash, track and field, gymnastic dancing, basketball, soccer, speedball, and water polo occupy third place

COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 5
Contribution to the Psychological Development

Chart shows the relative contribution of each activity on a scoring basis of 0-10



with scores of 8. Gymnastic games and relays, heavy apparatus, tumbling and pyramids, playground ball, touch football have scores of 7. All other activities range 6 or below for physical contribution.

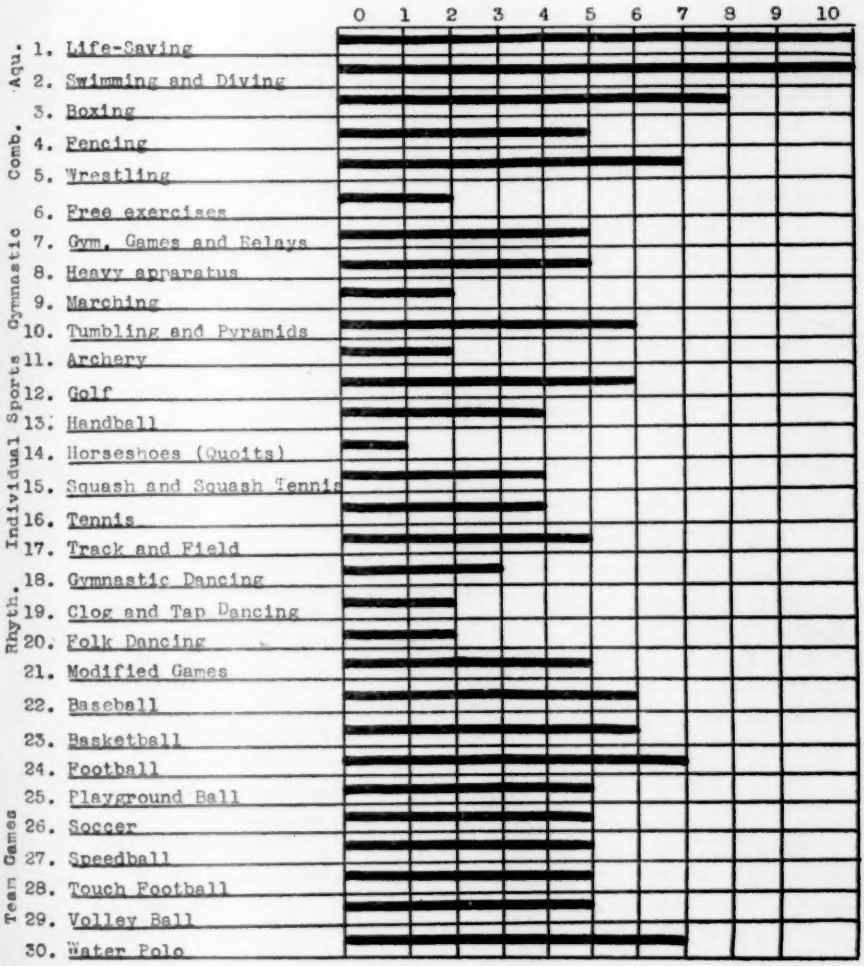
Chart number 4 gives the relative contributions to *social* development. Here football leads with a high score of 9, followed closely by basketball, soccer, speedball each with scores of 8. Life saving, gymnastic games and relays, golf, tennis, modified games, baseball, playground ball, touch football, volleyball and water polo follow with scores of 7, while squash alone scores 6. All others are rated 5 or less.

Chart number 5 gives the *psychological* contribution. Basketball

COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 6
Contribution to the Safety Development

Chart shows the relative contribution of each activity on a scoring basis of 0-10



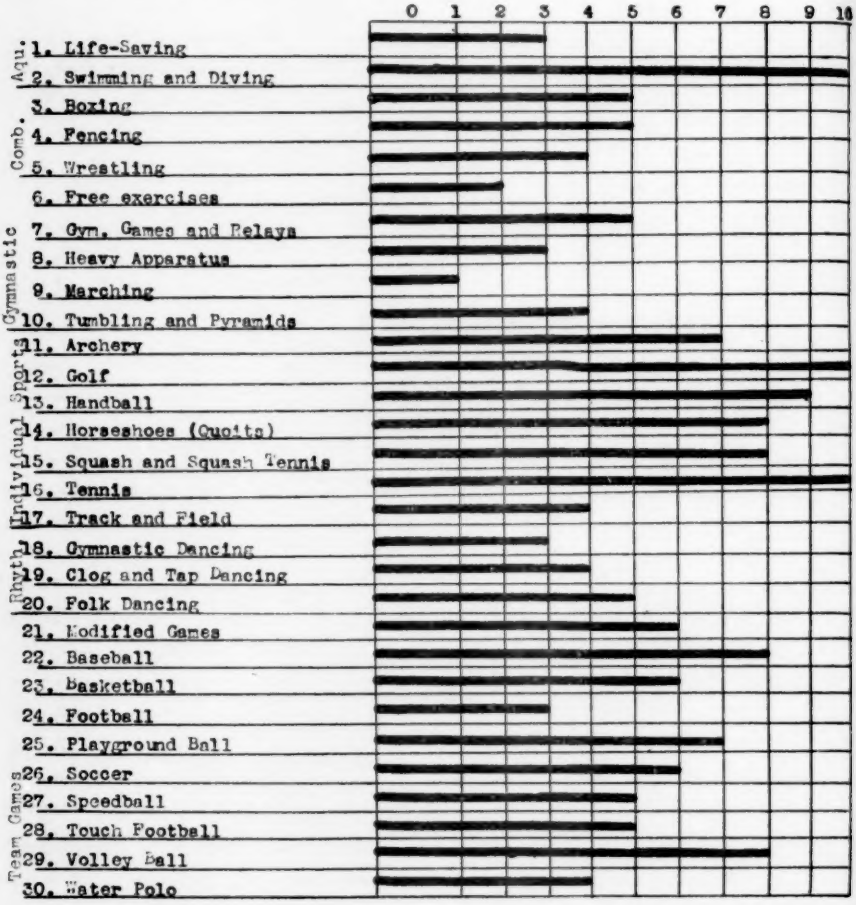
and football received the highest rating with scores of 8. Life saving, golf, tennis, baseball, playground ball, soccer and speedball divide second honors with scores of 7. Swimming and diving, boxing, gymnastic games, handball, track, modified games, touch football, volleyball and water polo received scores of 6. All other activities were rated 5 or less.

Chart number 6 estimates the contribution to *safety* skills. Life-

COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 7
Contribution to the Recreational Development

Chart shows the relative contribution of each activity on a scoring basis of 0-10

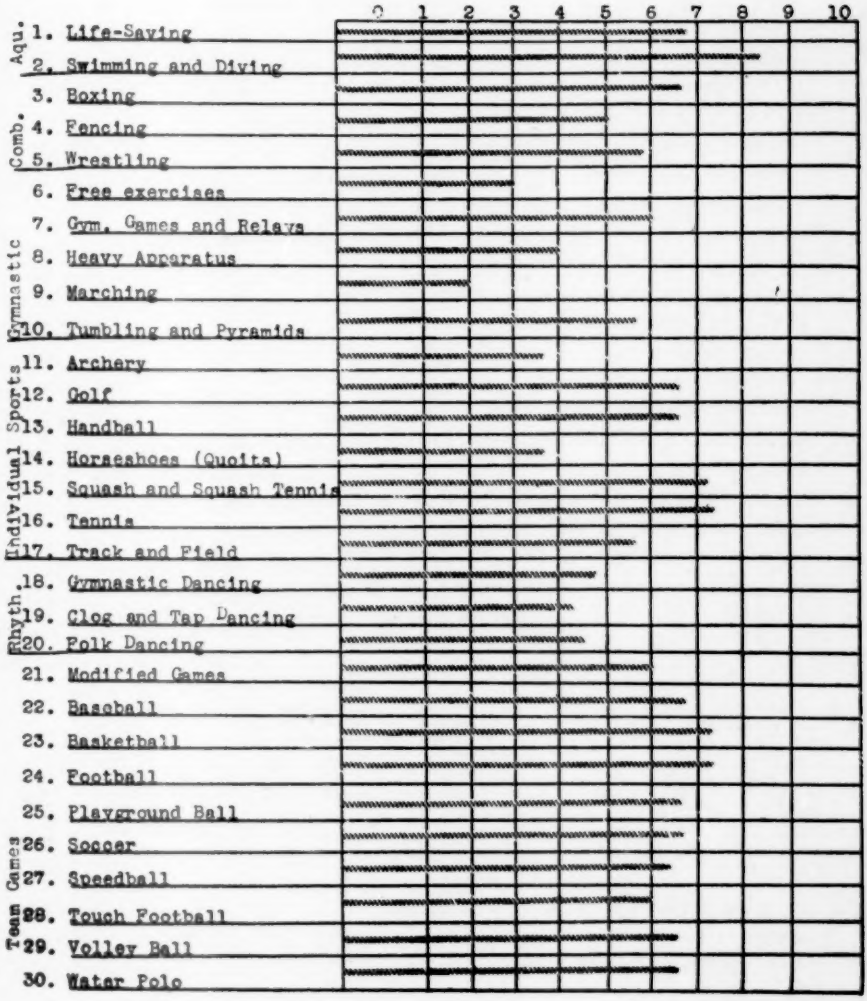


saving and swimming and diving naturally take first place with median scores of 10 each. Boxing is second with a score of 8. Wrestling, football and water polo each score 7. Tumbling and pyramids, golf, baseball and basketball received scores of 6. All others were rated 5 or below. The remarkably low scores of most activities in contribution to safety, might be explained on the basis of the possibility that the raters consider the activities to have little value from the safety standpoint. On the other hand, it is possible that such rating merely indicates that those doing the scoring have not analyzed

COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 8
Contribution to the All-Round Development

The chart indicates the average of the median scores of the various contributions of each activity. This is called the all-round contribution.



the activities adequately from the standpoint of their safety contribution. This suggests a definite need for more stress on the safety values of all activities or else a provision of other activities which will contribute definite safety values. Such need is increasing under modern complex conditions.

Chart number 7 evaluates *recreational* skills. Swimming and diving, golf and tennis received high scores of 10 each. Handball followed closely with a 9. Horseshoes, squash, baseball and volleyball received each a score of 8, while archery and playground ball scored 7. Modified games, basketball and soccer each scored 6. All others rated 5 or less. This record would suggest that if recreational skills are to be emphasized, a greater amount of stress should be placed in the program on the activities receiving high scores.

Chart number 8 presents the median scores for all-round contribution. These scores were secured by taking an average of the median scores of the five contributions of each activity. This chart presents the activities still arranged in the original order under the six main divisions. It is very easy to pick out in each division the activities that score highest and thus determine which activities in such a division should be given biggest place in the program. Under individual sports, tennis and squash score highest, with scores of 7.3 each. Golf and handball come next in order with scores of 6.6 each. Track is next with a score of 5.8. Archery and horseshoes score low with 3.5 each.

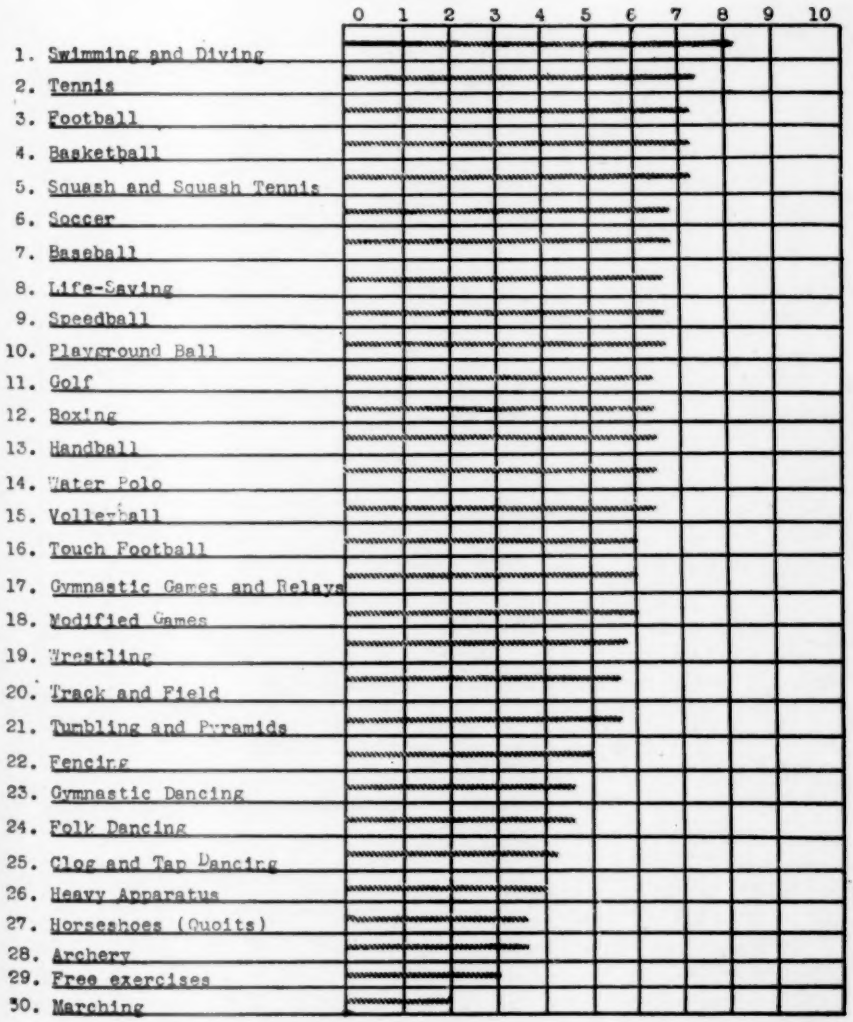
Chart number 9 is a re-arrangement of the all-round scores presenting the activities arranged in order of rank on the basis of their all-round contribution. The all-round median score is considered really the most significant score. The procedure in the study was to have each activity analyzed on the basis of its five major contributions in order that no rater would over-rate an activity because he was thinking of it from the standpoint of the physical alone. The average of the scores for these contributions was then taken on the assumption that it would represent the total or all-round value of the activity combining its various contributions, assuming these contributions to be of equal value. This would then indicate the estimated relative importance of the activity in the program. Swimming and diving is found to have the highest median score for all-round contribution at 8.2. Some of the other high ones in order are tennis, football, basketball, squash, soccer, baseball, life-saving, speedball, playground ball, golf, boxing, handball, water polo and volley ball. This constitutes the upper one half of the entire list of activities, ranging in score from 6.5 to 8.2. The remainder of the list scores rapidly downward from 6 to a minimum of 2 which was given to marching.

Chart number 10 presents a slightly different picture retaining the ranking according to the median scores for all-round contribution. For each activity there is indicated by parallel solid bars the median contribution for each of the five items, physical, social, psychological, safety, recreational, with the corresponding all-round contribution indicated by a broken bar. By a survey of this chart it is possible to see at a glance for a given activity its contributions that are given a

COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 9
Contribution to the All-Round Development

The chart indicates the average of the median scores of the various contributions of each activity ranked in order of importance. This is called the all-round contribution



COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 10

Comparison of relative contribution of activities ranked in order of importance on basis of all-round score (average of medians)

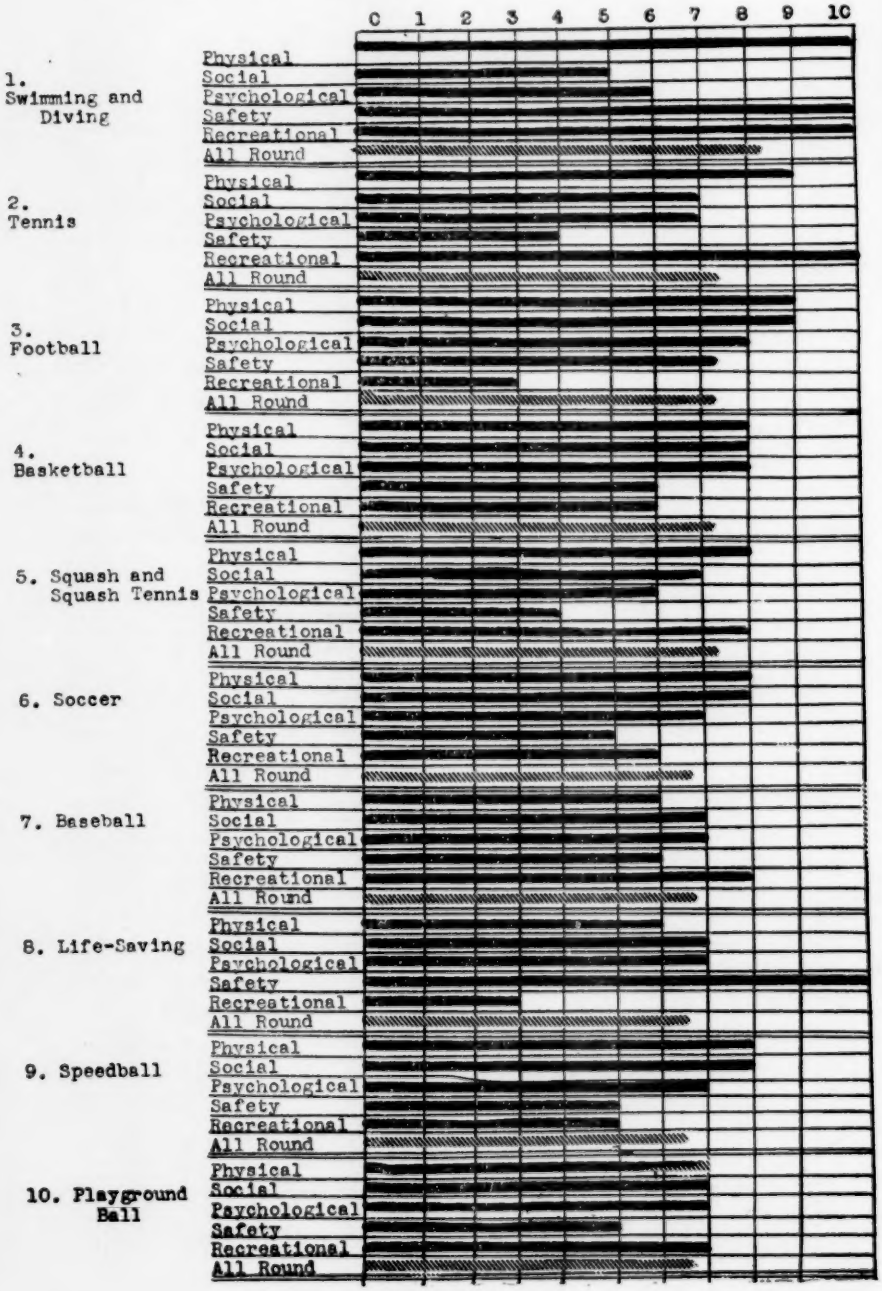


Chart 10—(Continued)

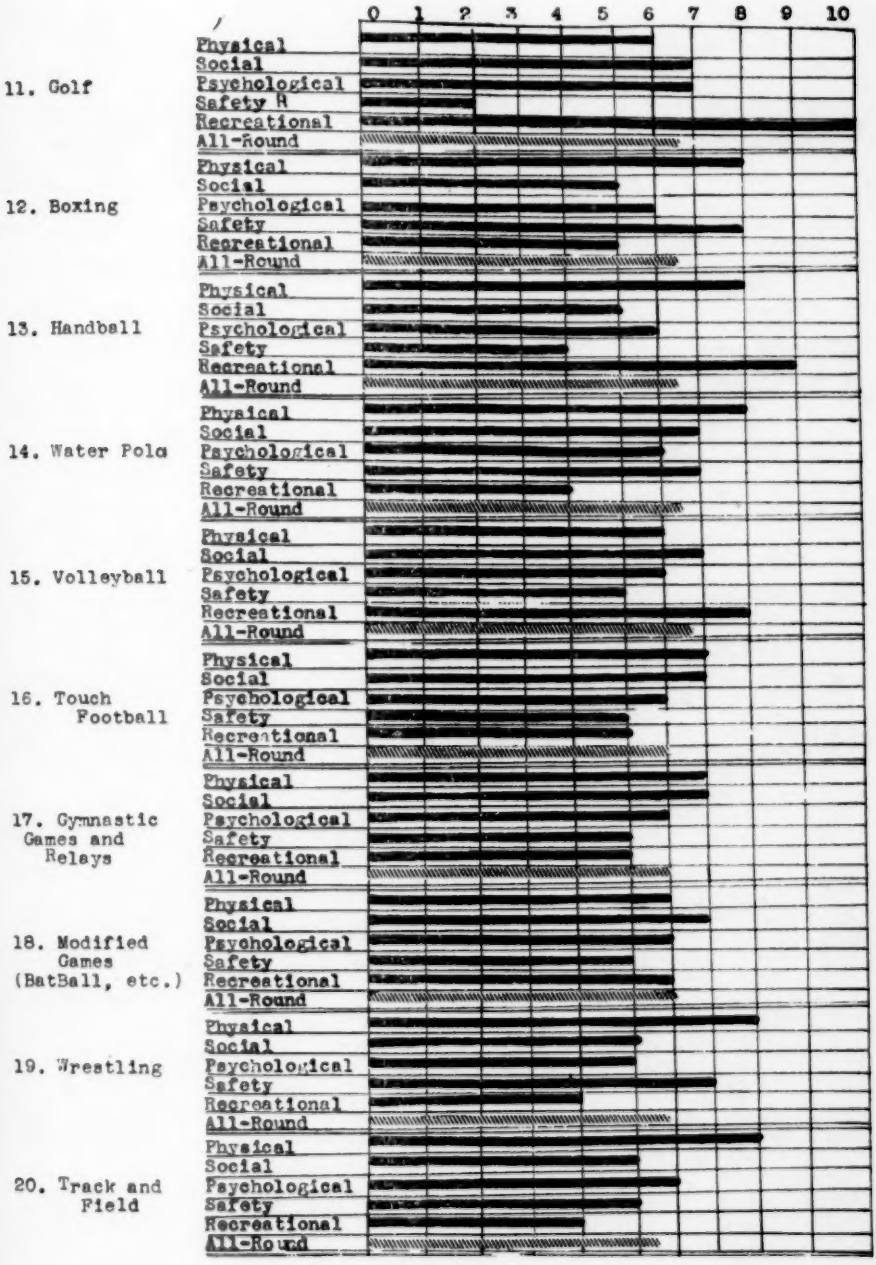
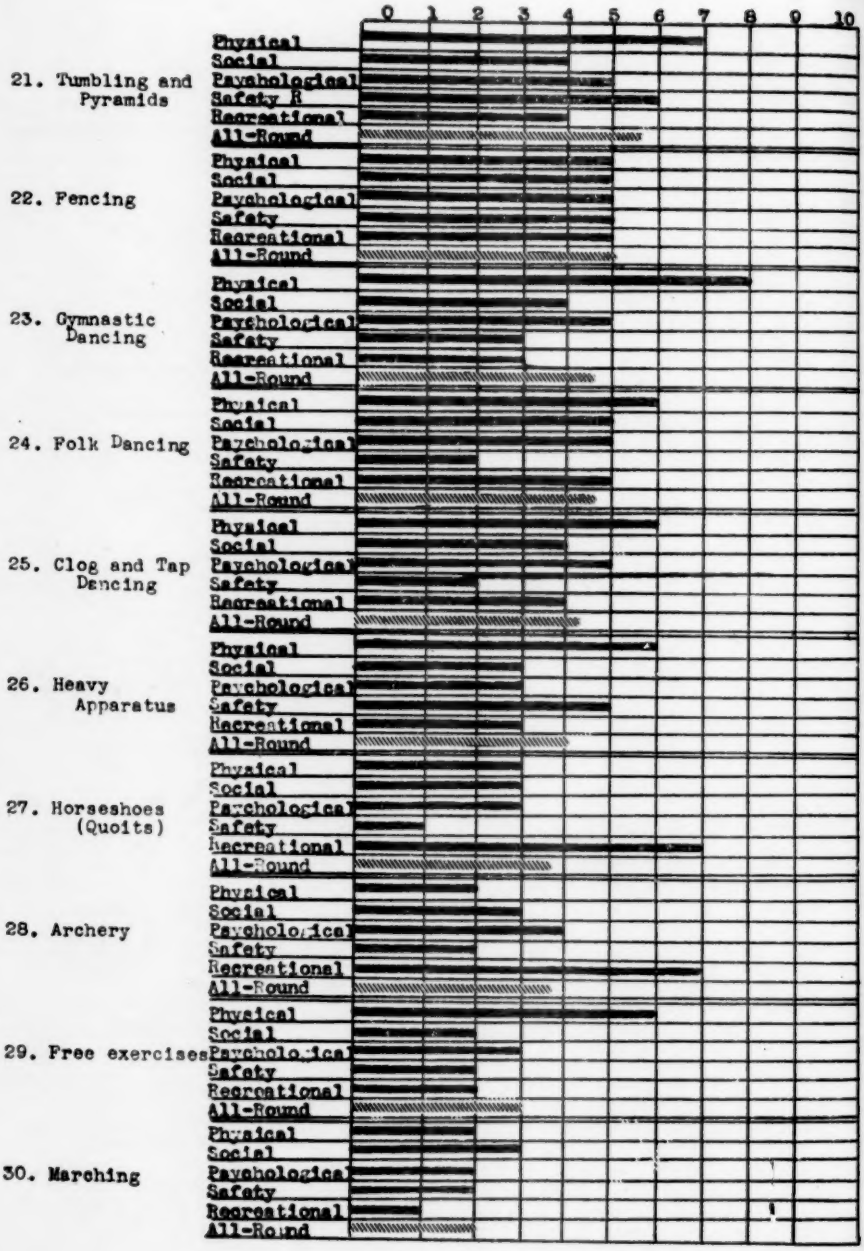


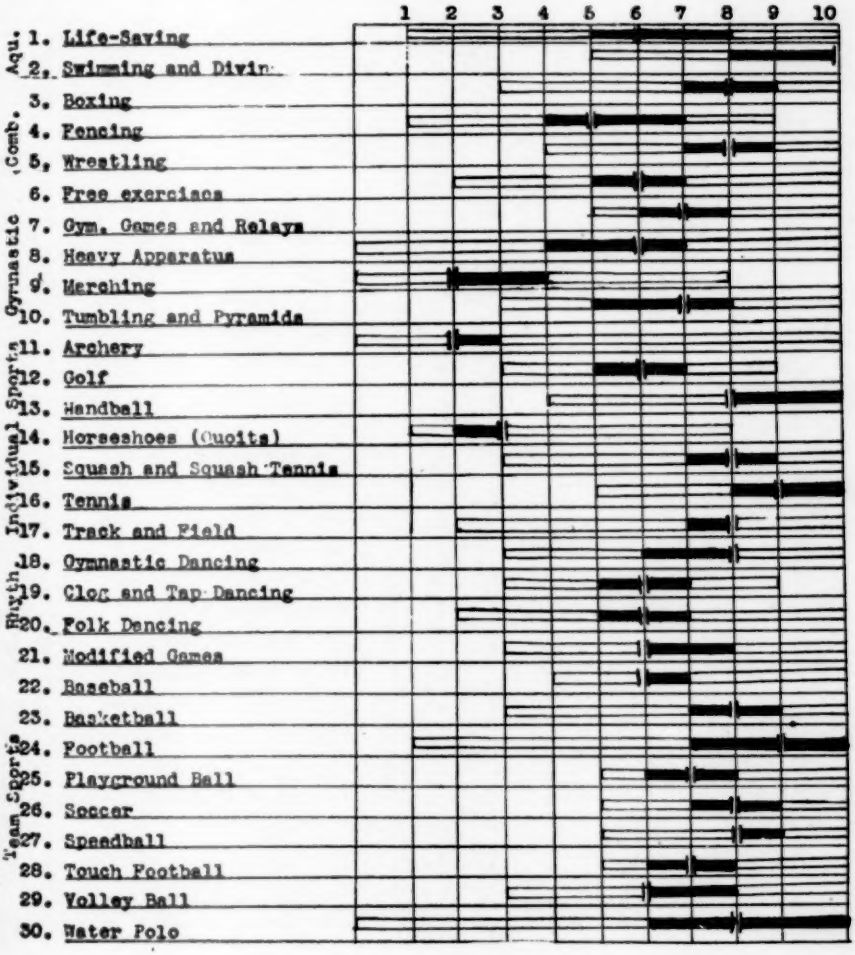
Chart 10—(Continued)



COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 11
Contribution to the Physical Development

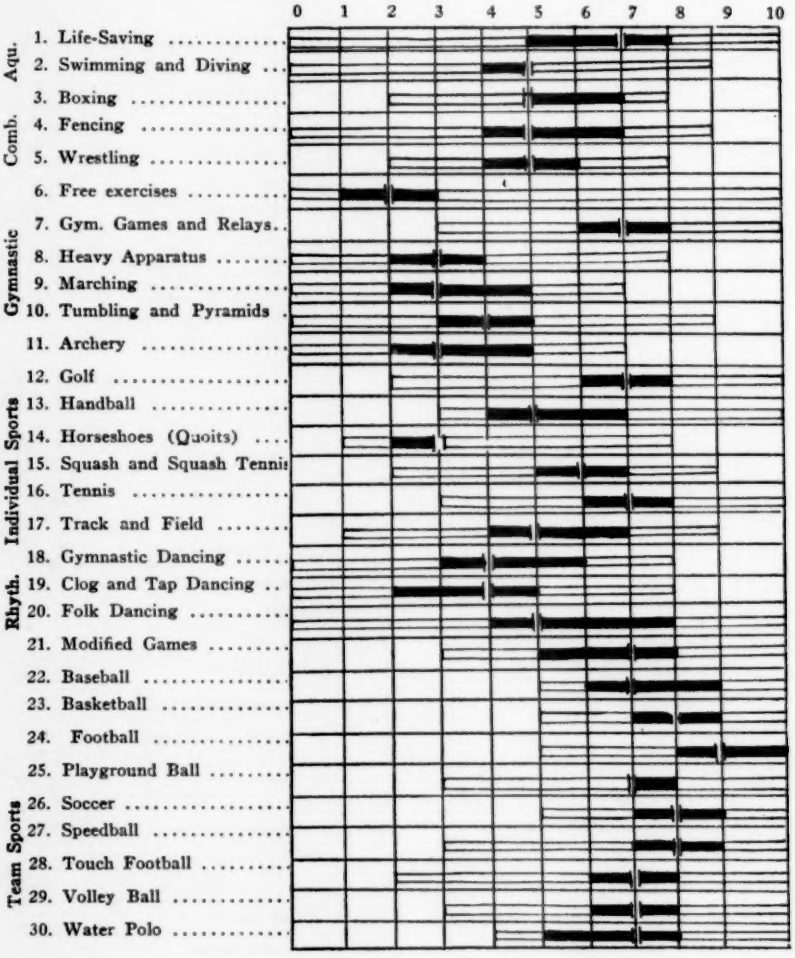
Chart shows the relative contribution of each activity on a scoring range of 0-10 The solid black bar indicates the range of the middle 50 per cent. The broken bar at the right indicates the upper 25 per cent, the broken bar at the left, the lower 25 per cent; the median the narrow white space midway of each bar.



COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 12
Contribution to the Social Development

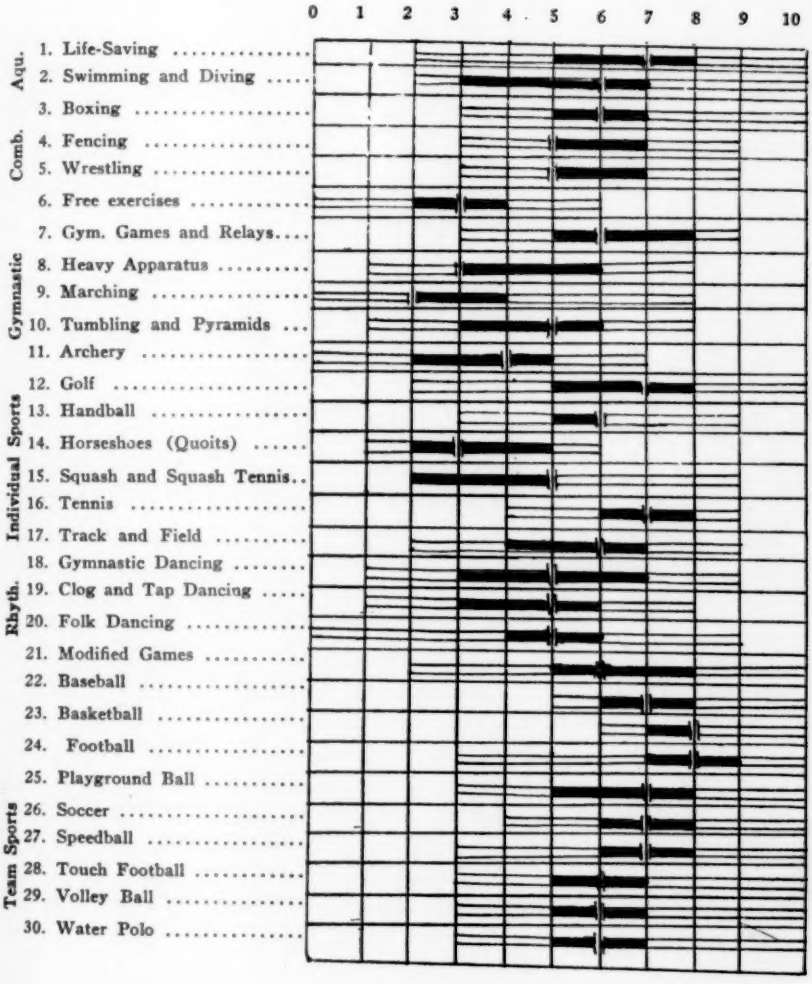
Chart shows the relative contribution of each activity on a scoring range of 0-10 The solid black bar indicates the range of the middle 50 per cent. The broken bar at the right indicates the upper 25 per cent, the broken bar at the left, the lower 25 per cent; the median the narrow white space midway of each bar.



COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 13
Contribution to the Psychological Development

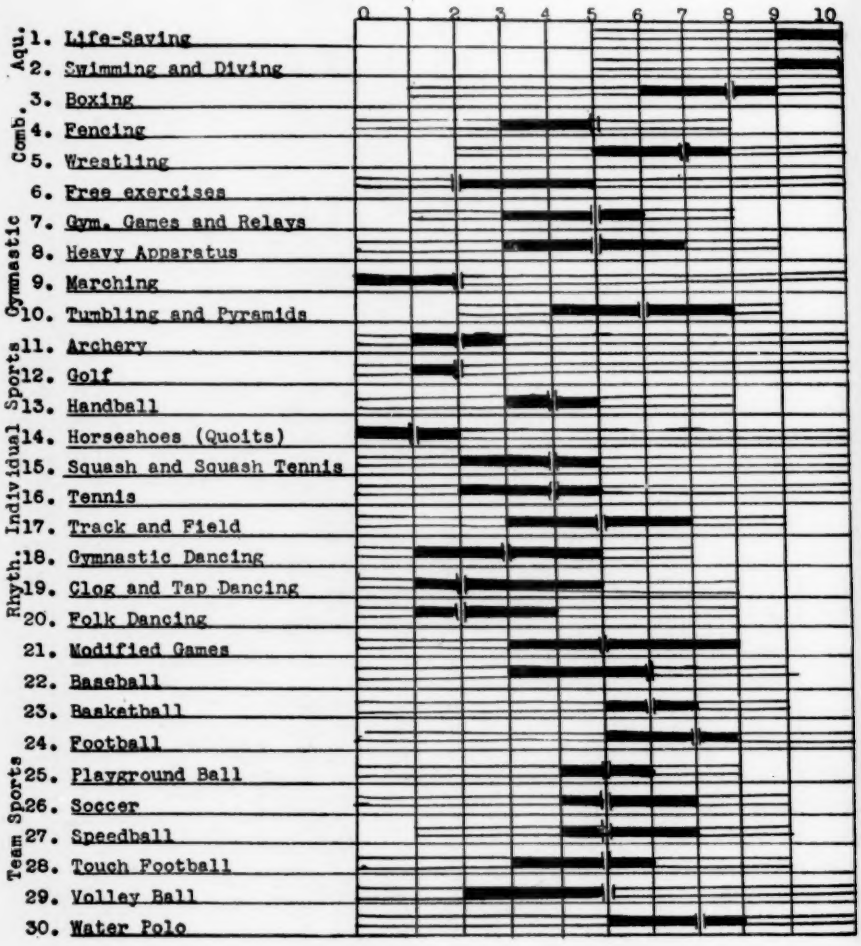
Chart shows the relative contribution of each activity on a scoring range of 0-10 The solid black bar indicates the range of the middle 50 per cent. The broken bar at the right indicates the upper 25 per cent, the broken bar at the left, the lower 25 per cent; the median the narrow white space midway of each bar.



COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 14
Contribution to the Safety Development

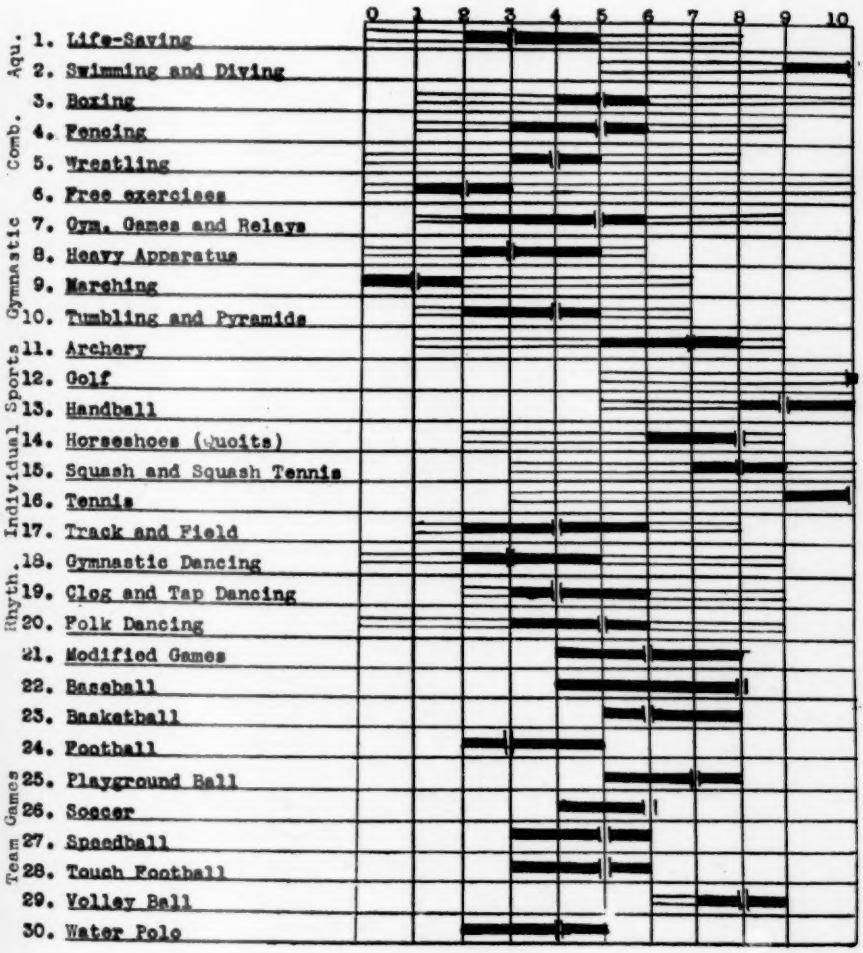
Chart shows the relative contribution of each activity on a scoring range of 0-10 The solid black bar indicates the range of the middle 50 per cent. The broken bar at the right indicates the upper 25 per cent, the broken bar at the left, the lower 25 per cent and the narrow white space midway of each bar the median.



COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 15
Contribution to the Recreational Development

Chart shows the relative contribution of each activity on a scoring range of 0-10 The solid black bar indicates the range of the middle 50 per cent. The broken bar at the right indicates the upper 25 per cent, the broken bar at the left, the lower 25 per cent and the narrow white space midway of each bar the median.

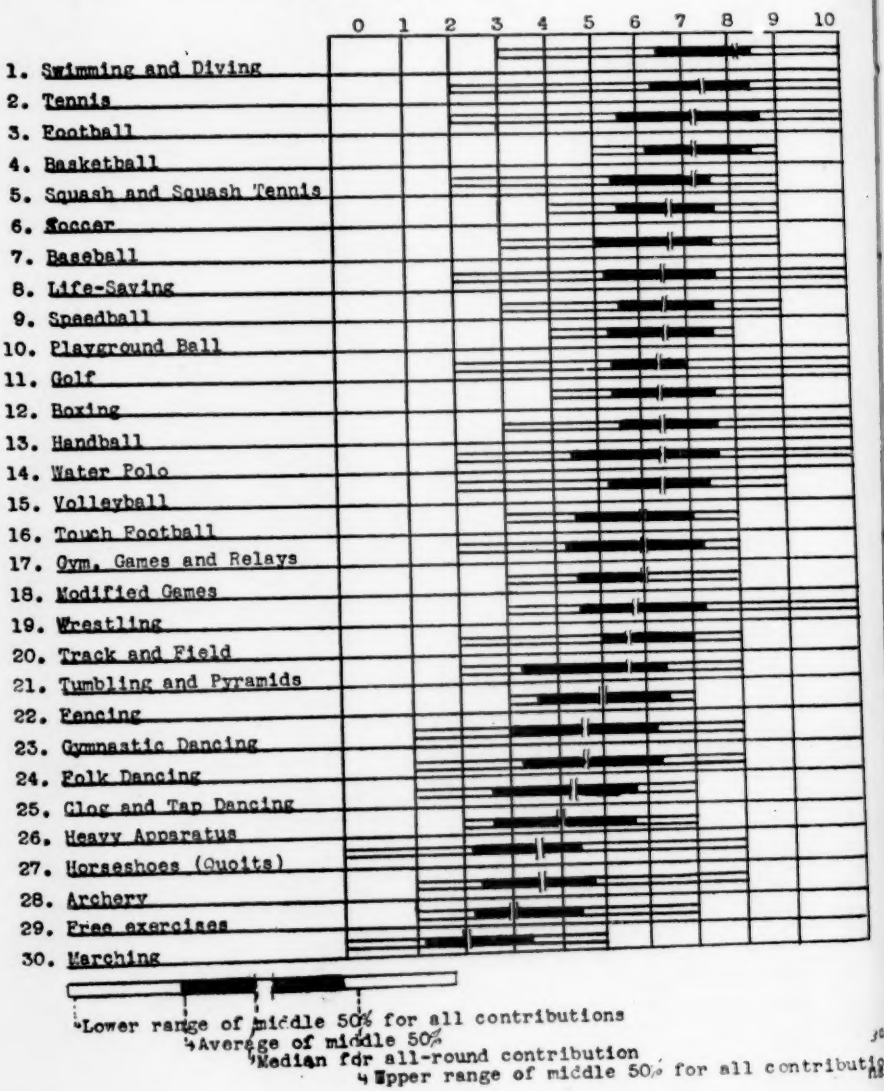


COLLEGE DIVISION

Curriculum Research—Boy's Physical Education Program—Chart 16

Ranked in order of importance on basis of median score for all-round contribution

Chart shows median score; average middle 50 per cent range; and total middle 50 per cent range.



high rating and the ones that are given a low rating. For example, swimming and diving received scores of 10 each in contribution to the physical, the safety and the recreational, but only 5 and 6 respectively for the social and psychological contributions, while the all-round score is 8.2.

Chart numbers 11 to 15 inclusive present quite a different picture. The attempt is made here to present for each of the five major contributions, a picture of the median score, the middle 50 per cent range, the upper 25 per cent range and the lower 25 per cent range. From these charts, it is possible to see at a glance where the median is located and find the limits of the middle 50 per cent range. Where this range is small, it indicates close agreement in opinion on the part of the middle half of the raters. This also eliminates the extremists at the upper and lower ranges. It will be noted that on the whole there is fairly close agreement on most contributions as indicated by the narrow limits of the middle 50 per cent. This is particularly true in the chart on physical contribution. On the other contributions the agreement is not so close.

Chart number 16 presents a composite picture of the preceding five charts. It gives an average of the various middle fifty per cents indicated in the preceding charts; spots the median at the center, and gives the total upper and lower ranges of the preceding middle 50 per cents. In addition, the activities are arranged in order of descending rank on the basis of the all-round median score used in previous charts. At a glance the reader can see from this picture the median score of the activity, the average range for the middle 50 per cent and the minimum and maximum ranges of the middle 50 per cents for all contributions.

Conclusions

In surveying the results of the study for the college division, it is interesting to note that the ranking chart number 9 on the basis of all-round contribution parallels fairly closely the all-round rating or central median tendency of last year's report, except that in this year's report, the median scores are not so high. There are certain differences in the ranking of activities, some of which can be explained by the fact that last year's ranking chart included the contribution of each activity to all school grades, whereas the present study is confined to the college division. For example, the highest ten activities last year included gymnastic games, hockey and track and field which are replaced this year by squash, baseball and life-saving. All the others of the first ten are the same.

Keeping in mind the limitations of any statistics based on subjective judgment, one might conclude for a college program of physical education, that any activity taken from the highest ten or fifteen

listed in chart number 16 would be an activity of unquestioned value. It would be equally logical to conclude that from this point on down the scale each activity might be considered of less and less value. This should not mean that only activities from the upper ranges would have a place in the college program, but rather that those toward the top of the scale should be given greater emphasis than the ones toward the bottom of the scale. Another way of interpreting the chart might be that if the institution were limited in facilities and teaching staff, it should attempt to provide for the upper range of activities first and add the others as opportunity offered later.

In spite of the limitations of such a study, it seems safe to assume that an institution would be justified in following in a general way the order of preference given to the various activities in this ranking scale. In each case, of course, there are bound to be local factors which will influence the selection of activities.

In submitting the report, the committee would recommend that it be authorized to complete the present study covering the various grades in a similar manner, to be issued as a supplementary report. The committee is increasingly impressed with the importance of the study and the great need for a further refinement of it. It seems certain that marked progress toward a scientific program can not be achieved until further agreement can be reached on the values of the elements to be included in the program.

The committee accordingly recommends that the study be continued for another year and that every member of the society submit constructive suggestions as to how the research can be carried on most effectively from the present point of progress.

The determination of curriculum elements logically leads to a study of testing and measuring progress in these elements, also to the need for improved technique of instruction. Furthermore there is great need for some basis of classification for institutions in terms of their conformity to standardized curriculum elements, adequate staff, adequate facilities, adequate time allotment, proper technique, etc.

The committee would again urge also, consideration of the possibility of securing the cooperation of other educational agencies in the furtherance of the study.

Respectfully submitted

Committee on Curriculum Research:

W. R. LaPorte, (Chr.) So. California

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Trends in Physical Education Facilities and Gymnasium Construction

Report of the Committee on Construction and Material Equipment

Prompted by the continuous demand for the monograph on "Physical Education Buildings," published in 1923, and actuated by the felt need for working principles of plant construction and the desire to keep pace with the trend in curriculum construction, your committee has made inquiry and study of the trend in gymnasium construction.

The sale of the above mentioned monograph is evidence of the desire for information of this type. The report of the Committee on Curriculum Research suggests the need of proper facilities to promote an evaluated program of physical education. The inquiries addressed to your committee further suggest the need for guiding principles to aid in planning the construction of physical education facilities.

Accordingly, for this study a questionnaire was prepared and sent to 208 colleges and universities. Seventy-nine replies were received. Due to the great distances separating members of the committee, the content of the study was prepared by the chairman after suggestions and advice by the committee members. The results of this study as presented in the following report are based upon the replies as tabulated, compiled and interpreted by the chairman.

PART I

Part one of the study relates to the trend in the construction of the various units of the physical education plant. The object was to determine the relative importance of these units as their usage contributes to the physical education program. The present or actual conditions and the recommendations as to future desirability were the comparative points. The criteria by which the units were rated are as follows: (1) absolutely essential, (2) extremely desirable but not essential, (3) desirable, (4) can do without and (5) unnecessary.

Major Units

The criteria were first applied to the following five major units, gymnasium, stadium, field house, playing fields and swimming pool. The results show that the gymnasium is and will be considered the most important unit in the promotion of a complete physical education program.

The value of the playing fields to the program is comparable to

the value of the gymnasium. Future plans characterize the need of playing fields as absolutely essential. Only one institution replied that it had sufficient playing space for future development.

The swimming pool is rated as the third most desirable and useful unit. Sixty per cent of the replies consider it as absolutely essential for future development.

The rise of the field house presents the outstanding trend in the development of any of the facilities. While only 19 per cent now have field houses, 79 per cent consider them at least desirable if not essential in the development of the future program. Geographical location is a factor affecting the desirability of a field house.

The stadium, as may be expected, is considered of more value by the larger than the smaller institutions.[1] Plans for future development do not indicate any tendency to place more importance to the value of the stadium than is now given.

Gymnasium Units

Applying the same criteria to the major units of the gymnasium there is little difference in the relative value accorded the importance of the main floor, showers, locker room and offices. Swimming pools are rated above special exercise and activity units. The need for these latter units is emphasized by the desire to include them in future gymnasiums.

In a like manner these units were divided into sub-units and rated. The following tables give the relative importance each was accorded. The ranking for the "present condition" and the "future recommendations" are the same unless indicated.

I **Main Floor**
1. Basketball Court
2. Physical Education Class Floor
3. Bleacher Space
4. Visitors' Gallery
5. Running Track
6. Dance Floor
7. Banquet Facilities
8. Stage

The tendency among the above units is toward less consideration for the use of the floor for dancing, banquets and stage facilities.

II **Swimming Pool**
1. Pool Proper
2. Heating Unit
3. Filtration Plant
4. Diving Equipment
5. Bleacher Space
6. Visitors' Gallery

III **Locker Rooms**
1. **Main (General)**
2. Home Team
3. Visiting Officials
4. Corrective Faculty

[1] For classification purposes the institutions have been separated into two groups; the "smaller" group composed of institutions with less than 1000 men and the "larger" group those with more than 1000.

Contrary to the above table the tendency in the larger institutions is to rate the corrective locker room above the officials' locker room.

IV Showers
1. Main (General)
2. Team Room
3. Staff
4. Faculty
5. Officials

Of the auxiliary shower units those for the team room and staff are most desirable.

V General
1. Office
2. Physical Examination Room
3. Lecture Room
4. Ladies' Room
5. Conference Room
6. Reception Room
7. Trophy Room
8. Library

There is a distinct tendency to favor the first four units above the latter four.

VI Separate Exercise and Activity Units
1. Handball Courts
2. Corrective Exercise Room
3. Wrestling Room
4. Small Gymnasium
5. Boxing Room
6. Baseball Cage
7. Squash Courts
8. Fencing Room
9. Faculty Gymnasium

Recommendations for the future show an appreciable gain in the desirability of squash, fencing and small gymnasium facilities, and in that order. Indoor cage facilities was the only unit to show a decrease in relative value.

VII Supplementary Rooms
1. Stock Room
2. Trainer's Room
3. Janitor's Room
4. Bleacher Storage
5. Drying Room
6. Apparatus Storage
7. Machine and Repair Room
8. Laundry

There is no indication of change in the order of desirability of these units.

Field House

It does not seem feasible at this time to rank the sub-units of the present field houses due to the scattered replies. A ranking according to future recommendations is presented.

Future Recommendations for Field Houses
1. Lockers and Showers
2. Track
3. Jumping, Vaulting and Weight Pits
4. Seating Facilities
5. Tennis Court
6. Football Field
7. Basketball Court
8. Baseball Field
9. Waiting and Lounging Rooms
10. Hockey Rink
11. Stage

There is little choice between the first seven units.

Playing Fields

The following lists combine the value given both "present" and "future" construction as the ratings were practically identical.

I **Intercollegiate Fields**
1. Football
2. Baseball
3. Track
4. Tennis
5. Soccer
6. Stadium
7. Golf
8. Hockey
9. LaCrosse
10. Rowing Course

The first four stand far above the others.

II **Intramural Fields**
1. Baseball
2. Track and Field
3. Tennis
4. Soccer
5. Volley Ball
6. Touch Football
7. Handball
8. Football
9. Playground Ball
10. Skating
11. Speedball
12. Hiking
13. Skiing
14. Horseshoes
15. Toboggan
16. Riding

PART II

Gymnasium Construction

The second part of this report concerns itself with the tendencies in gymnasium construction as shown in the past, present and future plans of construction. In the questionnaire sent out, specific questions pertaining to the more or less common elements were asked, with the expectancy that certain inferences, conclusions and suggestions might develop which would be of some future value as working principles of plant construction.

Main Floor

The first unit is the main floor. Gymnasium construction covering a period of 45 years offers a wide variety in construction features. The size of the main floor as given in feet, ranges from 36x65 to 165x210. The median size floor for the small college over this period of years is 60x100. The tendency is indicated by comparing this measurement with recent construction and future recommendations. The median for the last five years is 90x120 and the median for 30 recommendations is 80x120. It will be noted that the recent median not only approaches but exceeds slightly the size recommended. As may be expected the median size of the floors of the larger institutions is larger. The median for present floors is 80x100, for recent construction 100x160 and for future construction 100x170.

It is apparent that several factors will in part determine the size of any floor constructed. Among these factors are: size and growth of student body, amount and scope of required work, amount and scope of intra-mural activities, the size of the classes to be conducted and the extent to which spectators will be accommodated.

There is an expressed desirability to double the number of basketball courts now in use. The present outlay of courts show a median size of 48x85, however maximum size courts predominate. The recommended median size is 50x90. Several of the smaller colleges favor 45x85 as the desirable size.

Closely allied to the size of the floor is question of floor division. Of some 20 institutions dividing their floors, 16 use nets, 2 use doors and 2 use canvas curtains. The recommendations likewise favor the net but 12 prefer not to use any method of division.

The size of the classes scheduled to use the main floor has been mentioned as a factor in determining the size of the floor. Consequently the tendency in the size of these classes is of interest. Several of the institutions state that the size of their present classes exceed the maximum size class that should be conducted on their respective floors. While 60 men per class is the present mode, 50 men per class is the present median rating for the maximum size class and 30 is the recommended size. The median allowance of square feet per student was found to be 130. This allowance was based on a general activity program.

Although the tendency is away from the construction of balconies and tracks, the median widths are offered. Both the present and recommended median is 8 feet.

If there is one element upon which there is general agreement it is the use of maple wood as the top flooring. Birch, hard pine and oak are also used. As to the kind of finish to apply to this floor there is considerable variety as to present practice and a very definite tendency to recommend the finish now used in each case. Oil (usually linseed), varnish and natural finish are nearly equal in popularity. Two special treatments are of note; one is the use of china wood oil by Stevens Tech and the other a combination of boiled linseed oil, turpentine and Jap dryer as used by the University of Illinois.

Not a sufficient number of descriptions were received to indicate any tendency relative to floor construction. The use of sand and felt pads between the upper and supporting sections was noted, as was the use of water-proof paper between sections.

The problem of illumination involves a consideration of windows, skylights and artificial lighting. The side wall area used for windows approximates 25 per cent. The median of both present and recommended height of windows above the floor is 6 feet. Where balconies or tracks are present 15 feet is the median. As to the type of window

used, the pivot or swinging type and the louvre type are supplanting the casement sash.

Only 8 of 23 recently constructed units include a sky light. The advisability of a sky light seems very uncertain according to the available figures. On the basis of total floor area, the median allowance for sky light is 12 per cent.

Owing to the various factors, such as the reflective qualities of inner wall surface and desired height of lighting units affecting the proper amount and kind of artificial illumination, it is difficult to venture any suggestion on this problem. It invites the attention of experts. The results of our study indicate a preference for the indirect or diffused style of lighting rather than the direct. There is a wide choice of reflectors both in use and as recommended. The more favored types are the porcelain, white enamel, X-ray and Cahill. To ascertain the proper amount of illumination the term candle power should be replaced by the term foot-candle, which is a measuring unit of illumination based on the distance between the lighting unit and the surface to be lighted.

Ceiling height showed considerable range; the upper height varying from 20 to 65 feet and the apparatus supports varying from 18 to 30 feet. The median figure for the upper or peak height was 30 feet and for the apparatus supports 22 feet. Recommendations approximated these figures.

Brick is the most used facing material for the inner wall while tile, glazed brick, wood and plaster are also used. The trend appears in favor of the use of glazed brick. Recent construction suggests little for future guidance as to whether or not the inner walls should be constructed to support apparatus.

Steam is nearly the universal choice as a means of heating the main floor, however hot air, both forced and recirculated is used. The use of recirculated washed-air is recommended by several. The heating units have previously been placed anywhere from floor to ceiling, but the tendency is to either recess these units in the wall behind a screen or place them on the wall from 6 to 8 feet above the floor or immediately beneath the balcony or track.

Locker Room and Lockers

The planning of the main locker room presents one of the biggest problems in plant construction. We can only outline some of the points involved and suggest some of the factors to be considered in approaching this problem.

Generally speaking, the type of locker system employed will determine the amount of space required for dressing and locker accommodations. We do not desire to advocate one system in preference to another but only to indicate the present tendency. Recent

installation shows a slight advantage in favor of the permanent system wherein the student uses the same locker throughout the year. However, recommendations advocate a change in the present system in favor of the basket or tote-box plan. As may be expected the larger institutions favor the basket system.

If the permanent system is used, the total number of students to be accommodated will determine the space requirement. This number may be based upon the total enrollment or only upon the number of men taking the required work during that year. If the basket system is used, a ratio of one locker to five baskets is the minimum ratio, and one to three the recommended ratio proposed.

Some of the factors upon which the installation of any system should be considered include; first, the number of years of required physical education; second, the extent to which intra-mural activities will be developed; third, anticipation of an increase in enrollment; and fourth, the use of auxiliary team locker rooms. Whatever the system installed, the desirable size locker room may be determined either upon the basis of space per locker, or space per student or both. To check one factor against the other would seem to be a more reliable working basis. Ten square feet per locker is the median allowance of present facilities, but fifteen is the median of recent construction. Forty square feet is both the mode and the median allowance for each student during the period the largest class uses the locker room. The relatively large difference between these two medians, ten and forty, suggests the inadvisability of planning a locker room without considering both allowances. A locker room built according to an allowance per locker may prove entirely inadequate when the peak load occurs, and likewise a room built entirely upon an allowance per student may result in a waste of space.

Using the lower quartiles in the allowance tables as a minimum allowance, eight and thirty-two square feet respectively, may we suggest the following formula as a working basis or point of departure in determining the size of the locker room.

$$\frac{\text{8 sq. ft. (minimum allowance per locker) x No. of lockers}}{\text{32 sq. ft. (minimum allowance per student)}} = \text{load that may be carried}$$

If the resultant or load that can be carried is equal to or exceeds the actual load which will use the locker room at a certain time, eight sq. ft. will prove a sufficient allowance; but if the resultant is less than the actual load, the allowance per locker must be increased until the loads are equalized.[1]

It is well established that the steel type of locker will continue to be used almost without exception. Although there is nearly an even

1. Example: $\frac{8 \times 200}{32} = \frac{1600}{32} = 50$ load that may be carried.
If the actual load is 100 then 16 sq. ft. will be required per locker. If the actual load is only 40, 8 sq. ft. will be sufficient.

distribution between the double and single type of locker, over thirty-five per cent of the users of double lockers recommend the single style. Among the single style lockers seventy-two inches is the prevailing height and 15x15 the median horizontal measurements. There is little choice in the double style, the favored sizes ranging from 36—12x12 to 48—12x12.

The key lock is disappearing and the combination padlock on the increase. The latter tendency is partially attributed to the tote-box system where the same lock is used on both box and dressing locker.

Concrete is the outstanding material used for locker room floors. Tile, however, is gaining favor. There were a few recommendations for floor covering materials, among which linoleum and rubber mats were favored.

The permanent or stationary type of bench is distinctly replacing the movable type. There is general accord that the main locker room should be below the main floor and on the same floor as the showers. There is considerable variance of practice and opinion as to the location of the team room in relation to the main locker room. Where it has often been in the same room, the tendency is to separate them and to have them on the same floor or adjoining each other. It was not clearly brought out whether the team room should be on the ground level or otherwise.

Shower Room and Showers

The trend in shower room construction and material equipment gives evidence of reducing to a minimum the problems of this unit as general agreement prevails in both present and future tendencies.

There is a wide range in the size of the shower rooms and relatively greater range in the number of showers in the present gymnasium, also a very low correlation with the number of men in the student body. As a whole, present facilities are considered inadequate.

Present practice indicates the median load per shower to be five men, whereas three is the recommended number. From this we may suggest that the number of showers will depend primarily upon the number of men in the maximum size class. Thus, if sixty is the largest size class, twenty showers are recommended to facilitate the movement of the class through the shower room.

Present construction also indicates the median number of square feet allowed per shower to be twenty-five, which multiplied by the number of showers needed will give the approximate area required for the main shower room. This principle is suggested as a working basis in planning future shower facilities.

In the shower room tile is replacing concrete as the desired flooring. Several kinds of tile are suggested, including mosaic, grano-

lithic, terraza, and non-slip.

The group type of shower, or as some prefer, the individual shower as distinguished from the individual stall type, is nearly a universal choice. A few schools prefer the individual stall.

There is a decided trend in favor of the mixing type of shower valve in preference to the dual or separate hot and cold type valve.

Every institution is apparently satisfied with their present hot water heating system as no changes are recommended. Types in vogue are: steam, boiler and storage tanks, and by a central heating plant. Pumps are sometimes used to facilitate the supply.

Swimming Pools

The problems associated with the construction and equipping of swimming pools are becoming simplified if we accept the trend toward standardization as a criterion. However, there are some features upon which there is both a difference of practice and opinion.

As in basketball the increasing interest in swimming is resulting in a definite effort to standardize, more or less, the size of the activity unit, be it court or pool. Whereas the 20x60 and 25x60 foot pools represent early construction, the 75 foot pool is now generally accepted as most desirable if not essential. In relation to the 75 foot length, 25, 30, and 35 foot widths are equally popular. Our observation is that the 30 and 35 foot widths are favored by schools where intercollegiate competition is held. The 36 foot width is also appearing, since this width permits using six lanes six feet wide.

There has been only a slight change noticed in the depth. For the maximum depth, nothing less than eight feet is now considered and the tendency is toward 10 feet. This may be due in part to the increased use of the ten foot diving board. The depth for the shallow part of the pool is usually from three and one-half to four feet. One pool recently built has an overall depth of seven and one-half feet, a smaller pool being used for beginners.

Two departures from ordinary construction are worthy of note. One is a pool 60x90 with an offset midway of one side. This is 30x30 and shallow for instruction purposes. The other pool of note is one 60x75, which has a deep and shallow side rather than a deep and shallow end.

The extent of the area surrounding the pool will depend largely upon the purpose for which it will be used. The accommodations for spectators and the amount of space needed for teaching purposes are determining factors in planning the surrounding area. The present tendency is to increase the area on the sides of the pool rather than the end. The median allowance is 25 feet for the sides and 25 for the ends. Thus, the average pool measuring 30x75 will probably be built in a room 65x100.

Permanent seating facilities are on the increase. Indications are that the gallery for casual spectators should be above the floor level or so as not to permit access to the pool.

Consideration in protecting spectators from splashing is changing from temporary to permanent measures. Canvas and oil cloth curtains are being replaced by permanent splash walls three to five feet in height and from six to 12 feet from the edge of the pool.

It is difficult to attempt to describe the various types of scum gutters used. Briefly the tendency is to recess the edge of the floor approximately six inches back from and six inches above the pool wall, and then to further recess the gutter beneath the floor. This permits drainage into the gutter without dripping into the pool. However, the desirability to divert the drainage away from the pool has resulted in the construction of a raised edge surrounding the pool. While recent construction shows about an equal division between pools built with scum gutters completely surrounding the pool and those with the gutters only on the sides, considerable attention should be accorded this point since the correct measurement and proper touch in competitive events is of relative importance. This problem is minimized by eliminating the gutters at the end and building the end walls solid.

The recessed or built in ladders are favored over the projecting brass.

Reports from nine schools using sky lights show that six of these are troubled by condensation drops. Those who advocate sky lights should be prepared to meet this problem. Some of the suggested methods for controlling condensation include; increase the amount of heat, forced ventilation, and build a sky light which can be opened.

Steam prevails as the favorite method of heating, but some recommend hot air. Thermostat control is also suggested. The tendency is to locate the heating units on or recess them in the walls.

A wading pool between the showers and the pool room is a feature included in a recent pool construction and has attained much favor where tried. It is highly recommended. One chemical foot bath is reported. This parallels the tendency to keep the showers in a separate room.

The following materials or methods have been suggested to deaden the noise present in most pools; Celotex ceiling, sound proof plaster, Acoustolithic tile, waved ceiling, cork, gypsum, oakum, and double walls.

Respectfully submitted,

A. R. WINTERS, *Acting Chairman*
A. I. PRETTYMAN D. K. BRACE
F. W. LUEHRING T. N. METCALF
C. W. SAVAGE H. A. SCOTT

A Gymnasium for Diversified Activities

By Frederick L. Ackerman
Architect, New York City

The scope of this statement is purposely limited. It does not attempt to define the facilities that should be provided in gymnasia for diversified activities nor state how these facilities should be arranged. The purpose is to describe a method of organizing facts and assumptions and of analyzing functions as a preliminary step to the formulation of a program of requirements. Only one dogmatic statement is offered. It is futile to attempt to design a structure for a definite purpose prior to the formulation of a definite and fully detailed statement covering its intended use.

The design of a University Gymnasium for diversified activities involves first of all a clear definition of its functions which in time must be translated into a equally definite statement of physical requirements.

For the purpose of more clearly illustrating the points involved in the definition of functions, the creation of a program of requirements and the design of structure, I shall refer to a case in point—the proposed Cornell Gymnasium.

As a preliminary step toward the design of this structure, visits were made wherever existing facilities or an interest in the general subject seemed to indicate that something of value could be drawn from experience. At the same time a survey was made of what had been written upon this head. This inquiry, which was carried on during 1924, revealed a rapidly growing interest and activity in the field of intramural sports and diversified physical recreation. With few exceptions, the activities were carried on under the handicap of utterly inadequate physical facilities. The wonder was that so much interest and activity could be developed under such unfavorable conditions.

It could not then be said, and I venture that it cannot be said today, that the experience available may be used as a safe guide in forecasting the extent to which adequate recreational facilities would be used by the student body, were adequate facilities made available. Nor is it now possible to forecast, with such meagre experience as a guide, the ideal relation that should obtain as between facilities provided for different categories of use. The best that we can do at this time is to draw as much as may be from what experience has to offer and hitch our assumptions to our ideals and our common sense.

So much by way of general introduction. We may now proceed to a more detailed and definite consideration of the problem.

At the outset it should be noted that in defining the functions and the physical requirements in a given case, we must deal with material facts and traditions that are both local and regional. That is to say, a gymnasium for diversified activities for Yale or Harvard would likely differ in a radical way from one in Florida or California. Climate, habits, interests—these bear upon use and function. So, from the complete list of possible functions we must select those that bear directly upon the case.

Whether the location of the gymnasium should be determined prior to a detailed definition of its function is an academic question. For in the majority of cases, the site must first be determined. In passing, we may profitably, I think, devote a few moments to this phase of the problem. In the case of the Cornell Gymnasium the selection of site was referred to the architect with instructions to study the problem and report. There was, as usual, a clearly divided opinion as between one site, located within the area of the athletic fields, and three adjacent sites. To reach an agreement seemed difficult through argument and discussion. Resort was therefore had to an analysis of the most important factors involved in location.

A map was prepared showing the geographical, or time and distance relation of the several possible sites to athletic fields, the academic buildings and the residential areas. From this map a series of spot maps were made disclosing the trends of residential occupancy and the future location of student body when the proposed dormitory group will have been completed. Time is too limited to go into a detailed discussion of what was disclosed by these time and distance studies. It is sufficient to say that by this method of analysis, the site recommended was selected and the discussion closed without further debate. For it was obvious that a gymnasium, to be used through the entire day and during the winter months, should be convenient to residential and academic groups rather than the athletic field, which in this case is located some considerable distance from these features.

The next step was one that will not ordinarily be as readily disposed of. We are faced with making decisions with respect to functions and facilities to be provided that will serve under a constantly changing system of use, operation and management. The facilities to be included must not only be such as to serve future needs but they must also, except in rare instances, be so chosen that a structure of minimum or mean volume will provide facilities for something like a maximum number. To illustrate: some indoor games and activities require some twenty-five times as much volume per man

as others. So that the typical problem in its broad outlines is obviously that of providing, within a reasonable volume of structure, for such diversified activities as will engage the interest of the maximum number of students.

In the selection of facilities we must be guided, to some extent, by local habits. But there are certain general considerations that obtain in any case. Some students will only respond to the prospect of participating in intramural or intercollegiate athletics: others will be interested only in games and casual play: still others will engage in physical exercise only under organized guidance, as in calisthenics, etc. So that diversity with respect to facilities is not merely diversity with respect to games: it is diversity with respect to types of activities—calisthenics, organized recreation, casual play.

For the purpose of gauging opinion as to future needs, a questionnaire in the form of a chart was prepared listing facilities likely to be considered. This was submitted to a number of interested individuals with the suggestion that it be used as a check list to aid them in expressing an opinion as to what the structure should contain, the number of students that would utilize the different facilities, etc. The returns from this questionnaire were checked against opinions obtained through the survey earlier referred to and after several conferences a definite program was set up for submission to the Buildings and Grounds Committee. Accompanying this charted program (Figure 1) of facilities was a tabulation containing the estimates of area and volume of structure required for each category of use so as to indicate roughly the magnitude of the project.

We may now profitably refer directly to the diagrammatic program (Table 1) derived from this chart which shows the functions and facilities as finally determined upon. In explanation of the several headings we have:

(1) *Facilities*

The rectangles below indicate the required area of the several elements. Spectators' galleries where required in connection with an element, are shown as an area without physical relation to the element served by it. Generally a gallery serves one element of a group. For example: there are six squash courts required; one is served by a gallery seating two hundred.

(2) *Total Use*

Figures under this head represent the agreed upon assumption as to the maximum number of students that would use a given element or group of elements during the term or year, as the case may be.

(3) *Daily Use*

Figures represent the agreed upon assumption as to the maximum number of students that would utilize a given element or group of elements daily.

(4) *Number of Periods*

Figures represent the agreement upon assumption as to the daily "turnover" or the number of times an element or group of elements would be utilized by different groups for classes, games or play.

(5) *Number per Period*

Figures represent the assumed number of students that would utilize a given element or ONE unit of a group of elements in class, game or casual play.

(6) *Length of Period*

Self-explanatory.

(7) *Hours*

The graphical indication under this head indicates an assumption as to the varying intensity of use during the hours of a day. A detailed study of this aspect of the problem would yield accurate information as to (a) the number of showers, and hence the amount of water required, and (b) the number of lockers necessary in case a tote-box system be used. The number of showers and the number of lockers of a tote-box system are functions of the peak load on gymnasium and fields; they have no direct relation to the enrollment or total number utilizing these features during the year.

(8) *Spectators*

Figures represent the number of spectators to be accommodated as noted above.

(9) *Light*

Notes below indicate an expressed preference as to source of daylight.

(10) *Temperature*

Figures indicate the average winter temperature required.

(11) *Ventilation*

Notes below indicate an expressed preference as between natural and mechanical ventilation. Certain features, of a necessity, must be provided with mechanical ventilation. The extent of ventilation elsewhere will depend largely upon the plan or arrangement, position of windows, etc., and cannot be finally disposed of prior to the preparation of drawings.

(12) *Net Area*

Figures represent net area required. In the case of calisthenics, for example, the area is a function of the size of class. In the case of games it is "regulation." The height noted is the height required in the games. In other cases it is assumed and is therefore subject to some modification. Any modification that might be made would not materially affect the total volume as noted.

(13) *Net Volume*

See the above. The figures represent "interior" or room volumes.

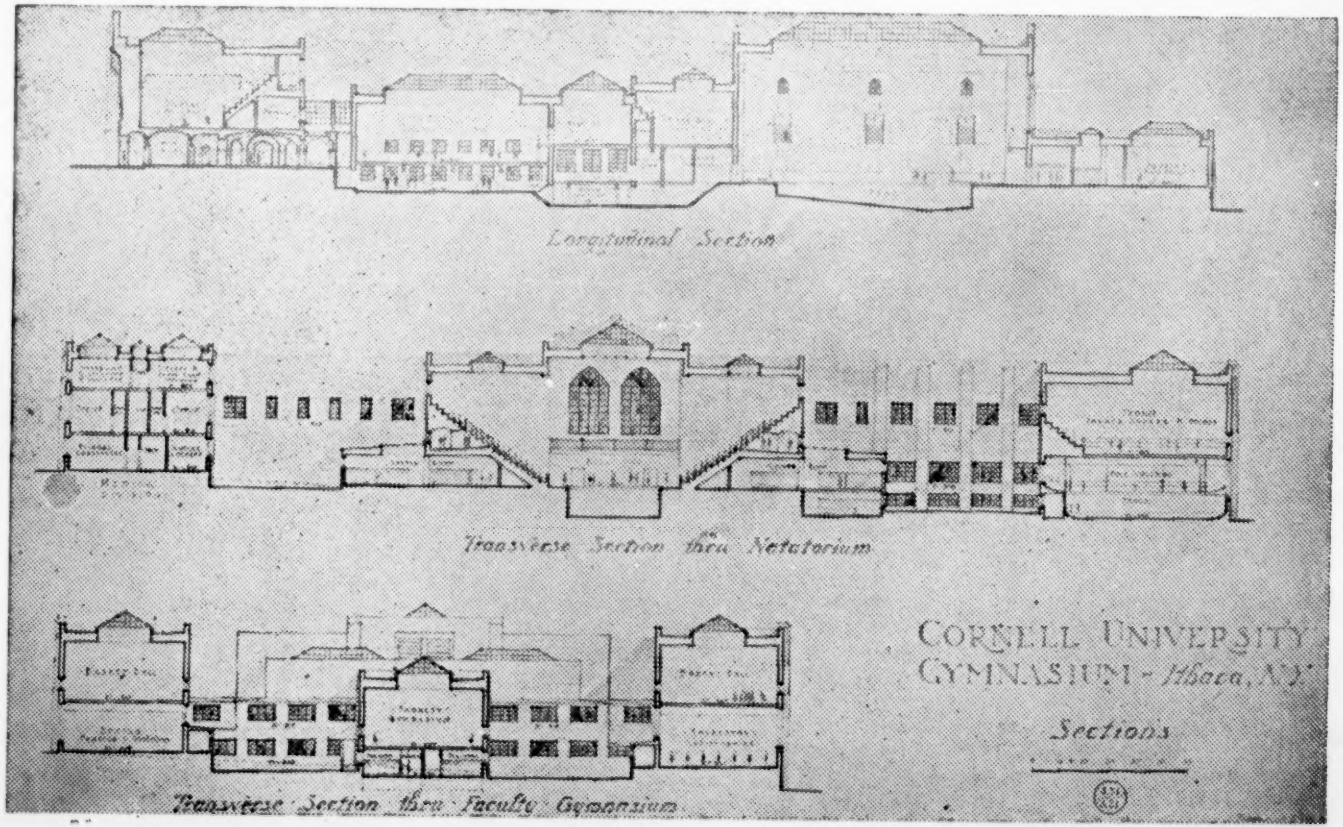
(14) *Gross Volume*

Figures in this column represent broad assumptions as to the additional volumes required for enclosing walls, floor and roofs. The allowance range from 33 per cent to 60 per cent of the net volumes according to span, etc. In addition to these allowances for structural features, further allowances are noted later to cover halls, stairs, etc., together with foundations.

(15) *Efficiency*

Under this head and self-explanatory sub-heads the figures indicate the relative efficiency of the several elements in serving the student body under the assumptions already made as to use. The relation between "efficiency per game" and "efficiency per day" indicates the "turnover" of use. They thus serve to check the assumption, for example, as to the number of basket ball courts to be provided and the number of students assumed to use the courts daily.

In the diagrammatic program an area is assigned for medical examination. This area was derived from a detailed study of the needs


Longitudinal Section
Transverse Section thru Natatorium
Transverse Section thru Faculty Gymnasium
CORNELL UNIVERSITY
GYMNASIUM - Ithaca, N.Y.
Sections

| FACILITIES | USE | | | | | HOURS | | | | |

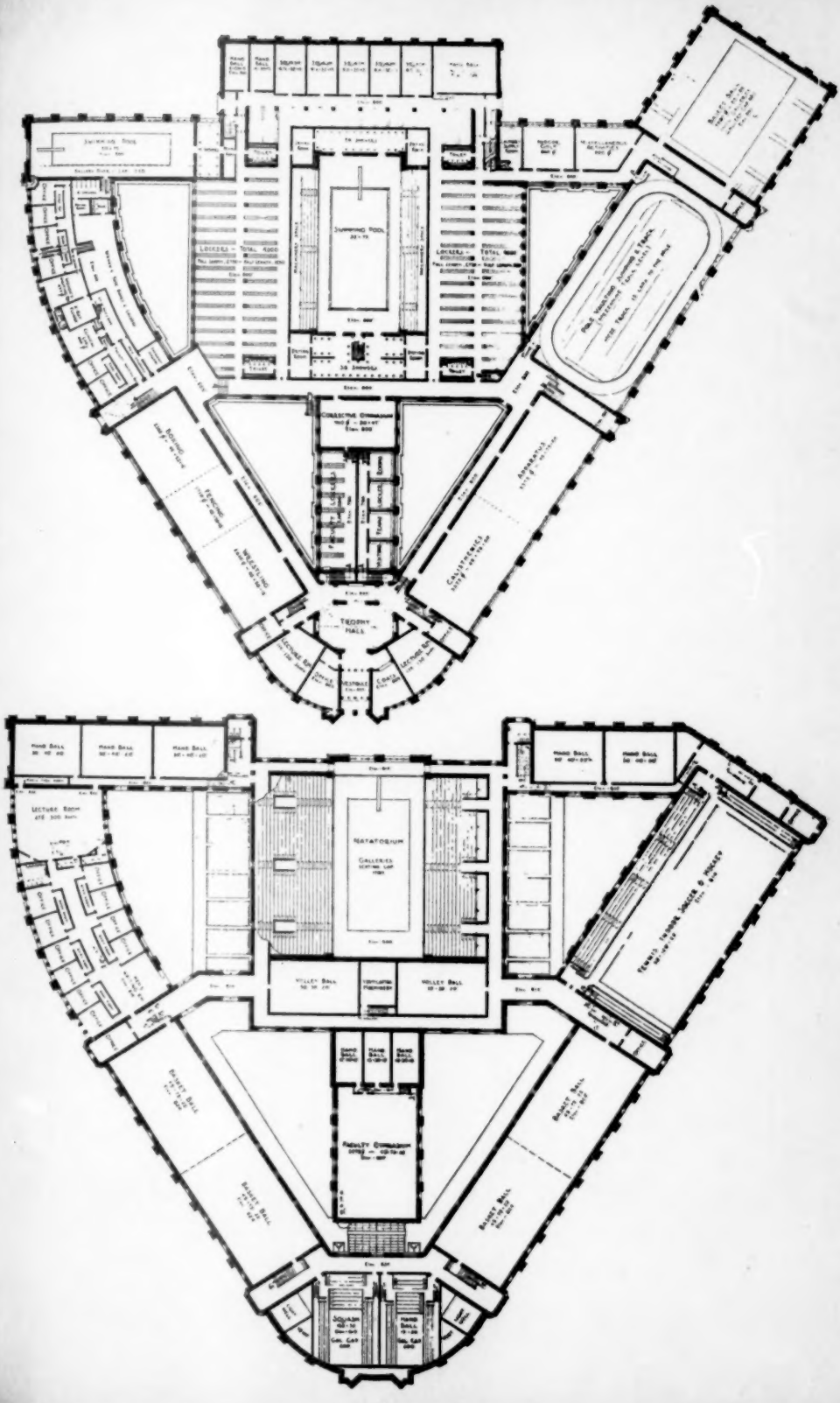

SWIMMING POOL
LOCKERS
TROPHY HALL
NATATORIUM
GALLERIES
LECTURE ROOM
FACULTY GYMNASIUM

TABLE 1.

Data From Completed Diagrammatic Program Showing Size, Use, and Maintenance of Gymnasium Facilities.

FACILITIES	USE					HOURS		AREA AND				VOLUME			EFFICIENCY		
	Total Use	Daily Use	No. of Period	No. per Period	Length of Period	A. M.	P. M.	Spectators	Light	Temperature	Ventilation	Net Area Sq. Ft.	Net Volume Cu. Ft.	Gross Volume Cu. Ft.	Sq. ft. per player per game	Sq. ft. per player per day	Min. Standard sq. ft. per player per game
Calisthenics 60x85x20 5100 sq. ft.	Class 1000	500	6+	85+	40 Min.	10-1	2:30-6	No	Side or Top	55°	Nat.	5100	102000	175000	60	10	50
Apparatus 50x75x20 3750 sq. ft.	Class 1000	500	6+	85+	40 Min.	10-1	2:30-6	No	Side or Top	55°	Nat.	3750	75000	125000	45	7.5	50
Rowing Machines 50x60x20 3000 sq. ft.	Class 500	400	Cont.	38			2-6	No	Side or Top	55°	Nat.	3000	60000	85000	80	7.5	80
Rowing Tank 50x60x20 3000 sq. ft.	Class 200	100	Cont.				2-6	No	Side or Top	55°	Nat.	3000	60000	100000		30	
Two Volleyball Courts 30x50x20 1500 sq. ft.	Game 200	100	Cont.	20	45 Min.		4-6 3-6	No	Top			3000	60000	85000	75	30	75
Five Basketball Courts 45x75x22 3375 sq. ft.	Game 1000	500	Cont.	10	1 Hr.	10-1	5-6 4-6 2:30-6	500	Top	55°	Nat. and Mech.	16875	370000	530000	337	34	3000
One Basketball Spectator Gallery, 500 Cap. 3500 sq. ft. 70,000 cu. ft.											Gal.	3570	70000	100000			
Six Handball Courts 30x40x20 1200 sq. ft.	Game 300	100	Cont.	4	30 Min.	10-1	5-6 4-6 3-6	200	Top	55°	Nat. and Mech.	7200	144000	190000	300	72	300
Six Handball Courts 15x30x15 450 sq. ft.	300	100	Cont.	4	20 Min.	10-1	5-6 4-6 3-6	200	Top	55°	Mech.	2700	41000	55000	112	27	270
One Handball Court Spectator Gallery, 200 Capacity, 1500 sq. ft., 25000 cu. ft.											Gal.	1500	25000	35000			
Pole Vaulting, Jumping, etc. 3 strips 12x120x20 4300 sq. ft. 3 strips, 12x45x20, 1620 sq. ft.	200	100	Cont.	14		10-1	5-6 4-6 3-6	No	Side or Top	55°	Nat.	5940	119000	150000 (—)	400	59	400
Tennis, Indoor Soccer, Hockey 50x120x25 1620 sq. ft.	200	40	Cont.			10-1	5-6 4-6 3-6	500	Top	55°	Nat.	6000	150000	225000		150	Tennis 1800 Hockey 1000
One Tennis Spectator Gallery, 500 capacity 3500 sq. ft., 90000 cu. ft.											Gal.	3500	90000	110000			

One Tennis Spectator Gallery, 500 capacity 3500 sq. ft., 90000 cu. ft.												**Gal.**	**3500**	**90000**	**110000**			
Fencing, 40x45x15, 1800 sq. ft.	100	50	Cont.	10		10-1	5-6 4-6 3-6	No	Side or Top	55°	Nat.		1800	27000	40000	180	36	200
Wrestling 40x60x20, 2400 sq. ft.	250	100	Cont.	12			4-6 3-6 2-6	No	Side or Top	55°	Nat.		2400	48000	60000 (—)	200	24	200
Boxing, 40x50x15 2000 sq. ft.	250	100	Cont.	10			5-6 4-6 3-6 2-6	No	Side Side Top	55°	Nat.		2000	30000	45000	200	20	200
Swimming Pool 35x75 5500 sq. ft.	3000	300	Cont.			12-1	4-5 3-5 2-5	1500	Top and Side	72° to 75°	Mech		5500	200000	300000		18	
Swimming Pool Spectator Gallery. Cap. 1500. 10500 sq. ft. 260000 cu. ft.												**Gal.**	**10500**	**260000**	**300000**			
Swimming Pool 15x75 3000 sq. ft.	1000	200	Cont.				2-5	No	Side or Top	72° to 75°	Mech.		3000	90000	120000		15	
Corrective Gymnasium 30x40x20 1200 sq. ft.	300	150	Cont.	25					Side or Top	60° to 65°	Nat.		1200	24000	32000			
Indoor Golf 20x20x15 400 sq. ft.	100	25	Cont.	2					Side or Top	60° to 65°	Nat.		400	6000	8000			
Lecture Room 35x40x15 1400 sq. ft.	200								Side or Top	68°	Mech.		1400	21000	30000			
Medical Examination Room. 60x260x15 15600 sq. ft.									Side and Top				15000	234000	300000			
Faculty Gymnasium 45x75x20 3375 sq. ft.									Side or Top	55°	Nat.		3375	68000	90000			
Three Thousand Lockers. 160x100 16000 sq. ft.									Side or Top	65°	Mech.		16000	200000	275000			
200 Faculty Lockers 28x50 1400 sq. ft.									Side or Top	65°	Mech.		1400	17000	22000			
Sixty Showers 40x50 2000 sq. ft.										72° to 75°	Mech.		2000	35000	45000			
Ten Lap Outdoor Track (8 to 10) Approx. 100x225. 10-12 ft. wide																		
Indoor Track 12 to 16 laps 6 to 9 ft. wide										68°					100000			
Toilets																		

of such a department and was based on the assumption that adequate physical examination would be provided for every student. The area set aside for lockers was derived from an assumption quite difficult to check, and provides for 3,000 full-length lockers on the ground that this would be sufficient for an enrollment of 4,500 students. The spacing, however, was sufficiently ample to allow for an increase in number, if need be; and with a small section given over to two-tier lockers, a locker could be assigned to every student in the University. The maximum number of showers required is readily derived from the schedule, which indicates the maximum number that might use the Gymnasium during a given period, plus the number that will use the Field.

With a definite program before us, we may now proceed to an analysis of it with a view of isolating such factors involved in use as would definitely condition the arrangement of plan, mass of structure, architectural treatment and character.

Let us examine some of these factors in detail:

I. *Heating and Ventilation*

(a) Natural ventilation is far more economical than mechanical in point of first cost and cost of operation. The values involved in a structure of this character are of a necessity large.

(b) The adequate *natural* ventilation of rooms of the shape, area and volume under consideration requires the provision of windows in the *two* side walls. Such windows should be reasonably near the floor; but they may be much smaller in area than those which would serve for lighting.

(c) Certain rooms, by reason of the nature of occupancy, must be mechanically ventilated. For example: shower rooms, spectators' galleries, rooms which require solid wall areas for games.

Observation (Heating and Ventilation as conditioning arrangement of plan)

From the above it follows that that type plan in which corridors serve rooms upon either side *must* be eliminated from consideration *wherever* natural ventilation is to be used. Obviously, the entrance to such rooms must be secured by a corridor system so arranged as not to cut off cross circulation of air.

II. *Factors Conditioning Height of Structure*

In the majority of cases the clear span required ranges from 40 to 50 feet. A clear span of 45 feet may be said to be typical.

(a) Floor spans of this length may be made economically by the use of standard steel girder.

(b) A two-story structure with clear spans as noted above is more economical than a structure one story in height by reason of the smaller quantities involved in roof, excavation, foundation, pipe trenches, length of steam, plumbing, and electric lines, shorter corridors, etc. Such a structure reduces by one-half the "roof exposure," an extremely important factor in heating.

(c) While a three-story structure might be economical in point of first cost the use of such a structure need not enter into consideration in this particular case. For it is readily seen that only one-third of the rooms could be top lighted; and the requirement of the program in this respect is that fully half of the rooms should be lighted from the top. Furthermore, a third floor

would be some 45 feet above the main floor. This fact alone is sufficient to eliminate three stories from consideration, since the area of plot is ample. This alone would not necessarily hold true in the case of property restricted in area where elevator service would become a necessity.

Observation (Height of Structure)

Given the above, it follows, other things being equal, that the economical structure is one or two stories in height. Departure from the above should be tolerated only to the extent that the area of the spaces requiring top light exceeds the area of the spaces which may be lighted from the sides.

III. *Natural Lighting*

The adequate lighting, both natural and artificial, of the various spaces constitutes an extremely important element of the problem. To state the problem of natural lighting in broad terms, we have:

(a) Certain activities, that is to say, certain rooms, require top lighting. In some cases a maximum sky zone is required. In other cases the sky zone should be definitely limited, the glass set within definite limiting angles with respect to the horizontal, and the glazed area of roof so placed with reference to the floor area as to provide maximum luminosity near a definite wall or portion of the room.

(b) Certain activities, that is to say, certain rooms, are equally well served with light source from top, sides and, in a few cases, from the end of rooms. Under this latter group some activities require high, side or end light. With a few, adequate illumination without special direction as to source is all that is needed.

Conclusions Concerning (I) *Heating and Ventilating,* (II) *Height of Structure, and* (III) *Natural Lighting,* may be drawn as follows:

(a) The maximum area of those features that do not require top light limits the area of the structure that may be built two stories in height.

(b) Except in the case of rooms that are to be provided with mechanical ventilation, the rooms should be ranged in wings with low corridors along the side so as to allow of windows above. Second floor rooms should be approached by stairs so placed with reference to a pair of rooms that second floor corridors may be reduced to a minimum. (This, of course, does not apply to four wall handball courts and spaces requiring top light and mechanical ventilation.)

(c) A frank acknowledgment of top lighting requirements would result in a great diversity of roof forms. It will not be possible, therefore, to treat the roofs in certain traditional ways. A pleasing mass and silhouette must be secured through other ways and means and expressed in other terms than traditional roof forms.

IV. *The Use of Facilities*

An analysis of the program from the standpoint of use discloses that the several features of the building may be roughly classified as Public, Semi-Public, and Private. These are merely approximate terms which will be more clearly defined.

(a) *Public Use*

The program calls for several spectators' galleries. Access to those should be had directly from the exterior of the building. This is not to suggest complete segregation nor separate entrances; but spectators should be able to reach the several galleries without traversing the corridors of the building and there should be provision for complete "control" for certain limited periods.

(b) *Semi-Public Use*

It is assumed that the halls and corridors, except as noted later, will not be under "control" as required in the case of many types of institutional structures.

(c) *Private Use*

The two swimming pools, the locker rooms and showers for both students and faculty should be intimately connected; and these connections should be independent and separate from all other corridors.

(d) *Segregation—Men and Women*

This problem occurs only in the case of (c) above, when one of the pools is given over to the use of women students, and in connection with medical examination.

(e) *Inter-relation of Elements*

There are but a few functions involved which require a definite interrelation as between the elements of plan. Obviously, the rowing tanks and the rowing machines should be adjacent; rooms for calisthenics, apparatus, etc., might well be close together. Lockers should be adjacent to showers and swimming pools and centrally located. Faculty lockers should be adjacent to pool and to the Faculty gymnasium. Lockers for both students and Faculty should be centrally located, affording minimum traffic to rooms.

V. *Derivation of Architectural Character*

Arrangements and masses which frankly acknowledged the objectives noted above under I. to IV., inclusive, would, of themselves, establish an architectural character. It remains to consider certain additional matters not referred to above but which are of sufficient importance to call for acknowledgment in design.

(a) The number of elements in the ground floor area is large: the enclosing wall is therefore long. A plan containing enclosed courts (as opposed to a plan with open courts and wings) would provide a minimum length of halls and would afford opportunity for the use of inexpensive materials in the court walls.

(b) The use of local stone is assumed for the exterior. By reason of the system of floor construction assumed in the sketches, the use of large windows in first story, where maximum light is required, it follows that the logical and economical exterior wall treatment consists of a system of exterior piers (buttresses in effect) with light, non-bearing masonry walls between.

(c) The majority of the rooms, which average 50 feet wide and 20 feet in height, are lighted from the sides. It follows that the windows in such spaces should provide a maximum glass area, that is to say, the openings should not be reduced by heavy bars and muntins. Acknowledgment of this requires the avoidance of any architectural idiom in which the stone mullioned window is a characteristic feature.

Part II

Papers from the Proceedings of the National Association of Physical Education for Women in Colleges and Universities

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Professional Progress Through Research

By C. H. McCloy

Secretary for Research in Physical Education,
National Council, Y. M. C. A.

PROFESSIONAL progress in any science leads through at least four stages. The first is that of trial and error. The pioneers, relative inexperts, muddle along, trying first one thing and then another. By the time-honored process of "try, try again" they slowly progress from a condition of scientific ignorance to a place where some real values begin to accrue. In the second stage "leaders" of the past are quoted. These are often wrong, almost always have a narrow vision—but state opinions with the assurance and forcefulness of the patent medicine advertiser. These "authorities" frequently hold back scientific progress for decades.

The third stage is that of speculation and argumentation. Authorities are frequently doubted. Solutions of problems of *fact* are sought through debate. This is the stage of philosophizing.

The fourth stage is that of hypothesis and experimentation. At this point, the leaders of the science seek first to secure the facts, and then to draw their conclusions. This is the stage of research, which may be defined as a careful, extraordinarily earnest, and well organized effort to ascertain essential facts about something at present unknown. It involves constructive, creative thinking, and scientific analysis based upon experimentation, historical documents, observations, collections of objective data, and careful ratings. It should be as mathematically precise and accurate as possible, as objective as the type of data permits, and should be subject to verification by others. The research worker should be absolutely impartial, unbiased, and intellectually honest. He should set out to ascertain the facts and seek the results with an absolutely open mind. He should not accept the opinion of so-called authorities, of committees, or of a majority as facts. He must not reason from silence or from absence of evidence, but should consider these as historical background until verified.

This fourth, the scientific or research stage of a science, may conceivably be quite inadequate. This is due to the differing temperaments of men, the all-too-frequent contempt of the scientist for the philosopher, and the usual disregard of the "practical teacher" for both.

It is here that I should like to propose for your consideration an outline of an attack upon the problems of physical education. This

method seems to me to avoid many of the shortcomings of an approach through research alone. The suggestion is not original with me but is a concept frequently advanced in some form by educational philosophers.

You will agree with me, perhaps(that in all constructive studies of physical education one should first formulate one's own philosophy of a particular field of physical education or of physical education in general. The standard of a philosopher is different from that of a scientist. A *scientific* study endeavors to ascertain the *facts* alone. A *philosophical* study endeavors to present an integrated whole which will *most adequately explain* all the *known* facts, and advance the most adequate hypothesis to explain scientifically *unknown* factors concerning which there is speculation. Philosophizing upon physical education should illuminate many problems concerning which there is no available scientific knowledge, but which are important to scientific progress. Scientific research should isolate these problems from all complicating factors, make the commonly used phrase, "all other things being equal," an actuality, and ascertain the essential facts. These facts or solutions should then be fitted into their proper places in the philosophy. Some of them may be so revolutionary as to require a complete revision of the philosophy.

To this team of the philosopher and the scientist must be added the technologist—the physical educator who applies the system! He is the *doer* of the job and comprises the vast majority of us physical educators. Such an approach should avoid the not infrequent conflict between the experimental scientist, the philosopher, and the "practical educator." The scientist, the philosopher, and the man in the gymnasium and on the field must be united. They must not be allowed to grow hoary whiskers of inert tradition.

The philosopher, the scientist, and the technologist may be embodied in one person. So complete a balance is rare. I believe, nevertheless, that the research student should start with a well thought out philosophy and should not be content to relinquish his scientific research until it has been successfully applied by the technologist and until it has proven an effective solution for the problem.

After this introduction to research, let us consider some of the elements involved in it.

Finding the Problem. A research worker necessarily begins with a problem. Probably everyone working in this field has been requested to suggest a problem for someone to study. How are problems born? I hope you will all assist in combating the theory that the doctor brings them. The important ones are legitimate brain children of expert educators. Intellectual step-children seldom receive the care one gives one's own. The following methods have proven fruitful in proposing worthwhile problems.

1. Write out your philosophy of physical education. When you come to something you would like to know but do not know and cannot find, write it down on your research hope chest. Analyze the field into its separate parts and study these parts.

2. In all reading, discussions or lectures, and at all other times, write down at once any "hunches" that come to you. Many times reading or philosophizing will reveal gaps in your present field of knowledge. Write these down. Read the best studies made in your own field; think about a problem; and note the questions which arise. Criticize and challenge statements made in current professional periodicals, in books and research studies in your own and allied fields. Literally hundreds of research problems will result.

3. Prepare a paper upon some subject in which you are interested and extend it into unknown realms.

4. When you meet an obstacle in your thinking, analyze it for the problems it suggests.

5. With what are you dissatisfied in your field? What problems does it suggest?

6. Analyze and challenge the popular beliefs in your field. You will be appalled by their unquestioned acceptance.

7. Associate with people in research; confer with faculty members of professional schools; seek the society of the intellectually competent individual who likes to debate the opposite side of any question. He may be wrong, but he will open up useful leads. Especially seek discussion with those who radically differ with your own philosophy.

8. Criticize general educational practices. Again note your "hunches."

9. Observe the problems which grow out of a procedure in which you are interested. For example, if you are interested in the historical method, browse around in the history of physical education for promising problems.

10. Read bibliographies of recent research, of dissertations and the like. These are fertile sources of information.

From these processes of inquiry into all these things many suggestions will come—which of them should one adopt?

Selecting the Problem. In the selection of a research problem there are a number of common criteria:

1. Is the problem in the realm of research? Will it add to the store of new knowledge?

2. Does it interest you? It may be a splendid problem but you should wholly pass it by if it does not strike fire.

3. Does it possess unity? That is, does the problem work together into a whole or is it a potpourri of a number of problems which should be attacked separately, or which are only superficially related? I think we should perhaps dwell a moment upon this. Very frequently one selects too large a problem. There are experimental problems, historical problems, and philosophical problems in it, all of which should be separated to clear the way for the main problem.

4. Is it worthwhile? Will it unify knowledge? Has it real content? Will it make a worthwhile contribution?

5. Is it feasible from the standpoint of difficulty, time, expense, and availability of data?

6. Is it timely? That is, are there available measurement tools and is there a demand for its solution? As an illustration, many character education problems are not timely because there are not adequate tools to measure characters.

7. Is it a problem that you can attack without prejudice? If not, you had better pass it on to someone else.

8. Finally. are you prepared in techniques to attempt the problem? The scientific woods today are full of unprepared statisticians attempting difficult statistical research.

Attacking the Problem. Without going into the field of recent publications readily available to you, it will perhaps be advisable to outline the usual steps in the conduct of research. In the appendix will be found a more detailed bibliography.

Assembling a Bibliography. Any librarian can tell you how to do this effectively. In addition to your ordinary library aids, a research worker in the field of physical education should utilize to the full the physical education bibliographies. A partial list of these is appended.

After collecting the titles of the publications germane to the subject, one should skim through these, looking for results already accomplished, for suggestions, and for methods of attack. At this stage in the process, it is well to discuss your whole problem with competent critics.

Limitation of the Problem. This step is too often neglected. The amateur research worker almost always chooses too large a problem. One needs to narrow the problem to a single definite field or to break it up into definite elements which are amenable to attack. Special care should be taken to see that the conclusions of the study are not to be based upon unproven assumptions. To illustrate: suppose one began to study health, and used one of the current cardiovascular tests as the sole index of health. It is obvious to the careful student that none of the tests have been sufficiently validated to become a standard upon which to base a serious research.

This stage in the set-up of the research problem may necessitate preliminary studies, particularly those which will provide measurement tools. Physical education today urgently needs more research of a pure science nature in the fundamentals of measurement.

Division and Definition of the Elements of the Problem. When the problem has been definitely narrowed, one should lay it out and analyze it so as to bring every element into the open. Frequently this may be accomplished by enumerating the questions which the study should answer. The standards which the study must meet should be proposed in detail, and the methods of attack accurately outlined.

Determination of Data or Evidence Required. At this step one needs to determine not only what data will be required, but also to delimit the group or groups from which the data will be taken. For example, one may decide to eliminate at the beginning all cripples, and those who have been operated on within a given length of time.

One might eliminate those who are more than a certain per cent overweight or those who are more than a certain per cent under-weight. One might also eliminate from some studies those who utterly lacked some essential element in preparation, just as one would eliminate from a study involving English language intelligence tests, those persons who understood only German. In this phase of the study one needs to be on guard for hidden factors which might complicate the study by remaining unseen and detract from the value of the results.

In determining the necessary data, one will need to take into account all of the possibly relevant factors. For example, in a study of athletic norms, one might conceivably find that performances are affected not only by age, height, and weight, but by distribution of weight on the body, by breadth of hips, etc. The factors which will in the end prove to be important can only be ascertained by trial, and one should endeavor to take account of *all* of them in collecting data, with a view to later eliminating those found to be of minor importance.

Selection of Techniques. At this time one must choose the appropriate type of research technique. The problem may be a *descriptive* one and require a questionnaire or some variety of interview. It may be an *experimental* problem requiring the equating of groups. It may be a causal problem necessitating correlation techniques, or it may require the techniques of *philosophical* research. In any case the selected techniques will frequently need some preliminary experimentation and revision. To illustrate: a questionnaire which seems to be thoroughly adequate may prove *obscure,* or may lend itself to inadequate classifications. At this stage, one may need to test the technique upon thirty to one hundred cases in order to improve the technique and simplify the study by the early elimination of unnecessary variables.

Collection of the Data or Evidence. This needs little comment except that data should be as accurate as possible, and that from this point on a careful experimental log of the work should be kept. All papers, computations, and everything that is written and retained should be carefully labelled and dated. This precaution is based upon the bitter experience of many people. A study may be discontinued in an emergency and when it is again taken up, often a great deal of work must be repeated because of unlabelled computations. An emergency removing the experimentor from this mundane sphere would render most unfinished work practically useless unless such a log were kept.

Analysis of the Data. Again little comment is needed. May I, however, exhort workers in experimental or causal research not to do foolish things with statistics.

After analyzing the data one should answer all the questions im-

plied in the set-up of the problem. Throughout the research, problems for further study should be noted.

At the conclusion of the study it may be quite in line to simplify the results. For example, it may be found that one can predict normal body weight to a ninety-nine per cent degree of accuracy by measuring ten parts of the body. One may find, however, that by measuring four parts, one can obtain ninety-seven percent accuracy. The final presentation of the methods may include these practical short cuts.

Test Conclusion. Do not publish theoretical conclusions that have not been checked by trial. This applies to the publication of methods based upon multiple correlations where theory has not been tested by trial.

I fear that the above may be rather theoretical and is none too clear. To illustrate the procedures, let me present two or three examples of the methods of setting up the problems. For the first I should like to suggest a project in the realms of descriptive research.

THE PROBLEM: *The Physical and Moral Effects of Uncontrolled Commercial Exploitation of Women Athletes in Basketball.*

Three comparable groups of women will be studied to determine:

(A) The physical benefits or injuries resulting from the type of basketball played by groups who play primarily to win, and are coached by men, with men's standards of competition.

(B) The moral effects, if any, that are attributable to participation in this kind of athletic competition program, as compared to those of contrasted programs carried on by similar groups of women.

The research may be set up as follows:

1. Read available publications, weigh them carefully to see whether they are based upon fact of opinion. If they are based upon opinion, is it scientifically controlled opinion or mere prejudice?

2. Build up a technique of standardized interviews which can be conducted by many different persons and still give complete results. These interviews might well be a combination of interview and questionnaire. The "interview" part should be written out and the part spoken by the interviewer should be memorized. After contact with women, questions may be presented by questionnaire and the answers checked. A space should be left for other impressions or remarks. An interview of this kind will secure almost one hundred percent response and will insure adequate attention for all the questions.

An alternative to this is the "group interview", where a large number of women who are "interviewed" at one time fill in an individual questionnaire.

The questionnaire and the accompanying introduction and explanation should be very carefully prepared and tried out on several dozen women to correct any weak points. The spaces to be checked should be so planned as to simplify tabulation and to secure significant and unprejudiced answers.

3. Select three groups of women to be interviewed. The first groups might be composed of women who had played for at least two seasons on the "women-exploited" type of teams in the time period selected. It would be wise to limit the time to a period of from five to ten years ago. The second group of women

might be those who had played upon well supervised school teams but who had not played the more strenuous type of basketball. The third group should be women who had never played basketball.

The first group should be chosen. Each individual should then be asked to choose two friends who had been in high school with her, who had been as healthy as she had been, and who had been in the same social set. The last two groups will be those "paired" with the women of the first group. Only women who had not born children should be selected. These women might reside in a number of different cities and the interviews might be conducted by a number of interviewers. There should be about a thousand women in each group.

4. Choose the interviewers carefully. Avoid choosing (a) women who want to prove something, (b) women who are gushy or effusive, (c) women who look too intellectual—they tend to "freeze" the response of the interviewed. When the interviewers are selected. rehearse them in the techniques of the interview.

5. Select and interview the women—that is collect the data.

6. Tabulate and analyze all the data collected, and work it over statistically in such a manner as to render it easily comparable.

7. Draw conclusions and fit into the whole philosophy of physical education for women.This is a problem primarily of securing accurate *opinion* and of presenting it intelligently and practically. The statistical treatment is very simple, involving only averages, percentages, and reliabilities.

I should like to take the second illustrative problem in the field of *causal research.* Causal research may be defined as a type of study that first measures results and then analyzes them in such a way as to ascertain relationships.

THE PROBLEM: *The formation of a Simple, Valid and Reliable Group Test for Measuring the Muscular Condition and Agility of College Women.*

The purpose of this test is to determine general muscular condition and agility as one means of classifying students for physical education. The test is not designed to measure athletic condition or degree of training, nor general motor ability or educability. It is simply to test the degree of *muscular* condition and *agility* the individual has at the time.

The outline of the study might be as follows:

1. Secure and analyze a bibliography.

2. Differentiate the sub-problems to be solved. The first of these is to find the best type of exercise for testing agility. This part of the problem is relatively simple.

3. Select a comparatively large number of exercises for trial. For example, one might select the exercise proposed by Mr. R. H. Burpee of the Harlem Branch of the Y. M. C. A. of New York City. First go to a squat rest, place the hands on the floor between the bent knees, then thrust the legs back to a front leaning rest (or prone falling position) and return to the stand, all in four counts. One might use a short potato race with only a distance of six to twelve feet between potatoes and basket. One might have the individual alternately touch lines six to twelve feet apart on the floor with one or both hands. One might do either of the last two performances with sandbags weighing about five pounds. The experimenters will readily think of other appropriate tests. The

exercise should be simple and vigorous, involving change of base and balance, and requiring little or inexpensive equipment.

4. Now select women possessing the qualities to be tested, varying from poor to excellent. These will have to be women whose ability can be accurately rated. This will be facilitated if the rating is made in seven categories as follows: (1) Exceptional; (2) Good; (3) Slightly better than average; (4) Average; (5) Slightly less than average; (6) Poor; (7) Exceptionally poor.

The ratings may be made by instructors or by a committee of students themselves. Only those students should be included in the rating whose abilities are known to the raters. The qualities rated must be carefully defined and the raters should discuss the process in order to attain to a uniform understanding. If the ratings have been accurately done, our best experience would lead us to expect at least a unimodal, somewhat symmetrical, distribution. If this is not found to be true, the ratings should be carefully checked to see whether or not all raters had the same standards. Ratings of the different raters should be averaged.

5. Next test the students with each of the selected exercises. Since this is a group test, it would be best to use a definite time of say ten to twenty seconds, having all the students start at the beginning of this time and stop at the whistle. Half of the group can count the "trips" made by the other half, and they can be scored in half trips. Careful instruction should be given in how to do the exercises and there should be some preliminary practice.

6. As a next step in the research, correlate the test results in each exercise with the judges' ratings, and select either the best of these exercises (the one which correlates the highest with the ratings) or a combination of more than one of the exercises, if the combination gives an unusually higher correlation than any one exercise alone.

7. For the last step, determine *norms* for this exercise or combination of exercises. In this part of the study, the elements that might effect the results should be measured or estimated. One way of doing this would be to study the best students and the poorest students in order to ascertain what elements determined their performance. All of the obvious variables should be included such as age, height, weight, and any other significant ones, for instance shoulder breadth, girth, breadth of chest, and breadth of hips.

Each of these variables should then be correlated with the performance of the chosen test or tests and partial correlations computed so as to ascertain the actual relationship of each variable by itself. This may involve tricky statistics because body weight usually gives a curvilinear regression with the other variables. This could probably be eliminated by using the cube root of weight.

After determining the *significant* items, the others should be discarded and multiple regressions computed for the remaining ones. In this way norms may be established for the type of students represented by the group studied.

This kind of study is easier to set up than the first one suggested for the data is easier to secure. It requires, however, much detailed and technical knowledge of the theory of statistical methods and more mathematical computation. Let me hasten to add that this knowledge is not at all difficult for any earnest student to secure and it is so important that such studies should not be attempted without either a

more than fair grounding in statistical methods, or access to an advisor who has such a background.

Permit me to outline one more project of still another type.

THE PROBLEM: *How Valuable is Danish Gymnastics as Compared to Any Other Given "System" of Physical Education?*

Let us call the other system "System X".

After the usual survey of the bibliography, the first step should be the formulation of criteria on which to base judgement of the values of the systems. These I shall not try to give in detail. They might well include anthropometric measurements of development, endurance, flexibility, agility, and certain skills. The criteria must be closely examined. For example, should flexibility be included—if so, why? If not, why not? These decisions may involve other important decisions which will determine the entire value of the results.

The next step would be to secure two groups that had been "equated". That is to say that the groups should be selected so that in qualities to be tested and in other qualities affecting the experiment, individuals should be paired off, so that the first individual in group one is about the same as the first individual in group two, etc., throughout the groups. Both groups should be willing and able to continue the experiment for a sufficient length of time to render the results conclusive.

The groups should then be taught, one by the Danish system and the other by system X. All other elements in the lives of the two groups should be unchanged insofar as possible. Both groups should be tested before and after the experiment in all of the criterion tests and any differences should be statistically checked for significance. Upon the basis of the results, the experimentor should be able to draw conclusions as to the comparative merits of the system studied. These conclusions should be valuable. They will certainly be more valuable than enthusiastic ebullitions of emotion based upon seeing the Danish system in action in its picturesque native setting or the condemnations of those who have not tried it at all. In such experiments more than two groups and more than two systems may be compared.

This last example I have given is in the field of *experimental* research and is widely applicable to program studies of activities and to studies of health practices.

It is always a temptation when writing a paper of this kind to try to condense a book into an article. This, you will agree, is seldom desirable or effective. For those, however, who may be interested in undertaking research projects in any field of physical education, we should advise the following procedure:

1. Read some of the best books and papers on methods of research. A number of these are given in the appended bibliography. These will give a bird's eye view of the research field.
2. Make a careful study of a few investigations in this or allied fields, studying particularly those which employ the kind of techniques you wish to use.
3. Secure a sufficient mastery of the essential techniques or secure the aid of those that have such. This will vary from a few days' reading and drawing up of questionnaires, to one or more years' study of statistics.
4. Secure intelligent criticism, even though you have a mastery of your techniques. Questions are always stimulating to genius.

Finally, begin. There is nothing especially difficult or mysterious in research, nothing that cannot be mastered by any capable mind. There are, however, methods that are good, and techniques that are essential. One must learn them just as one learns to play the violin before giving a concert performance. I believe, however, that there is no reason why a fairly large percentage of physical educators should not do effective research. Furthermore, I am convinced that it is only by the road I have indicated—that of philosophizing, carrying out scientific research, and making intelligent technicological applications that we shall raise the status of physical education in our educational institutions.

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Modern Trends in Physical Education

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INASMUCH as this group represents the Directors of Physical Education for Women in colleges and universities, I shall limit my subject to the field of higher education, and inasmuch as only a very few of the members of our Eastern Society of Directors have undergraduate or graduate curricula for the training of teachers, I shall further confine my observations to that field of Physical Education in colleges and universities which forms the common bond between our members, namely the physical education of the undergraduate student.

One should employ scientific methods of research in order to deal with such a subject adequately, such as a combination of what Mr. C. H. McCloy terms historical research and descriptive research, which would place this subject in the list of possibilities for thesis or dissertation studies. Owing to the limitations of time for preparation and space for presentation, no claim can be made of scientific approach or adequate treatment both of which this subject merits. It is to be hoped, however, that this paper will call to your attention several outstanding trends which have impressed me in my studies, personal conferences, and observations in the field of physical education for women in colleges and universities, and which I trust will call forth some discussion and without doubt differences of opinion.

I have selected seven aspects of this subject, among the many possibilities, to call to your attention the most. 1. Philosophy of Physical Education. 2. Attitude of the Administration. 3. Organization of Departments. 4 Tests and Measurements. 5 Equipment. 6. Programs. 7. Hygiene or health Instruction.

1. *Philosophy of Physical Education*

Undoubtedly, the most outstanding trend in physical education for women in colleges and universities is to be found in the philosophy of physical education itself. We have unquestionably progressed gradually from the early concept of physical education as a therapeutic health agent, a muscle developer, a corrector of deformities, a disciplinary agent, and a health preserver, to a new concept of physical education as an educational agent, a builder of organic power, of personality through the exercise of the instincts and emotions and of self-directing individuals equipped for happy and efficient living. In

order to make my point clear relative to this change in the philosophy of physical education, may I quote from statements of the aims of four different departments of physical education published in their catalogues approximately thirty years ago.

Ample opportunity is offered for the development of prize winners and star performers, but the policy of the department is first to aid those who are afflicted or deformed, secondly to preserve the health of those who are sound and well, and third to disseminate such knowledge of fundamental principles of self-preservation. (University of Washington, 1904-05, p. 142.)

The aim of this department is to secure a symmetrical development of the muscular system, to improve the circulation, and produce healthy action in all organs of the body. (University of Wisconsin, 1890-91, p. 144.)

To prepare students physically and thereby better mentally to battle with the world is the aim of this department. (University of Utah, 1893-94.)

The aims of the department are all in the direction of body-building and health preserving; the correction of deformities and the building of scantily developed parts, restraining the over ambitious, restricting the amount and kind of exercise and directing superfluous energy aright as well as teaching students to take better care of their health in matters pertaining to their every-day life. (University of California, 1889-90.)

A study of terminology employed over a period of approximately one-half a century shows an interesting trend in the philosophy of physical education. The term "physical culture" was used in the earliest catalogues followed by "physical training," and more recently by the term "physical education." These terms appear to reflect not only a changing philosophy in the subject itself but to parallel certain emphases in general education. Physical culture was used at a period in the development of higher education when the term culture was used; for example, colleges of general culture; and in the catalogue for 1880 of one of our eastern women's colleges the following classification of studies appears—aesthetic culture, religious culture, social culture, physical culture, and intellectual culture. Inasmuch as the teacher of voice culture was responsible for classes in physical culture, it is not surprising to find the similarity in name and the use of Delsarte exercises. The term physical training undoubtedly reflects the influence of military training. In the early development of physical education in our state universities, it was frequently a function of the military officers to give whatever physical training was offered. During the period when the term physical training was used, programs were made up largely of Swedish and German systems of gymnastics, systems at heart militaristic and dominated by formal discipline. With the failure of the foreign systems to meet the needs of college students together with the changes in general educational theory, from one of training and discipline to educating and directing, the term physical education came into vogue. One might proceed with the term health education, following the far reaching health crusades of recent years, but suffice it to say that fortunately our

colleges and universities have not adopted this term in the way other groups have done. At the present time physical education is the term almost universally used in colleges and universities.*

Mr. Clark Hetherington has expressed the aims of this modern physical education as follows: "Physical education is a phase of general education and its object should be interpreted in terms of the objectives of education as a whole."

With the changing theory and practice in modern education, there has been a very definite change in the field of physical education which is continuing at the present time, a shifting of emphasis from mass need to the need of the individual, a shift from uniformity to variation, a recognition of individual differences in capacities, needs, and interest. Our varied programs, classification of students, individual prescription, smaller teaching units, and elective systems are evidences of such a trend. Formerly little differentiation was made in the program from the standpoint of the individual. Usually the second year was different from the first, but as a rule all had gymnastics with the exception of the medically unfit who were permanently excused from all physical education, and a small number who had medical gymnastics. Exercise it was and a physiological effect was produced, but that was not everything. The concomitants attendant on the teaching of any required subject in the college curriculum, such as English, Mathematics, Physical Education, Hygiene, are destined to be somewhat unsatisfactory. Any required subject carries a stigma.

Today the trend is most certainly in the direction of dealing with individuals rather than teaching activities. We are first concerned with the individual, her capacities, needs, and interest. We then select and adapt our wealth of activities to meet these conditions. We cannot hope for success, however, until we can in practice demonstrate our theory of this new concept of physical education. The fact that physical education is a required subject may have been one reason why we have been so slow to be impressed with the necessity for meeting individual needs and taking into account the attitude of the students in our classes. Those of us who believe physical education can be a required subject and have valuable concomitants grow out of it must answer the query many are expressing, "why not give up physical education as a required subject?"

2. *Attitude of the Administration*

There is a growing understanding and an increasing appreciation of physical education on the part of the administration of our colleges and universities. With the change in public opinion regarding physical education from one of prejudice and antagonism to interest

* Organization of Professional Training in Physical Education in State Universities, (Ruth Elliott, Ph.D. Teachers College, Columbia University. Contribution to Education, No. 268, 1927, pp. 16-20.)

and, in general, understanding and support, there has penetrated into the academic group an appreciation of the power and influence of the department of physical education whether for good or ill. College and university faculties refused to recognize their responsibility in regard to physical education in its early history. As you are all aware, it was a purely student undertaking in its beginnings and considerable time elapsed before the teacher of physical education had academic standing. At first the trustees usually appointed as director of a gymnasium a faculty member who by virtue of other training and teaching ability merited a faculty appointment. Such directors frequently had a higher degree, a Ph.D. or M.D., but had no preparation for teaching or directing physical education. With the increasing opportunities for professional training in physical education, adequately prepared teachers became available. The colleges and universities were very slow to organize departments of physical education; only occasionally was faculty rating, rank and vote accorded the director of physical education. Frequently the director's name appeared on the salary roll but was not included with the officers of instruction. We must admit among ourselves that doubtless the director of physical education who has the old conception of physical education merely as exercise, who lacks a breadth of education, who is at home only in the gymnasium, and understands only her own narrow field, is a questionable candidate for professorial rank. Times have changed and with the opportunities available for advanced degrees which are still unfortunately the measure of attainment in academic circles, no director of physical education in any college should accept an appointment without a dignified position on its faculty with the privileges of rank, salary, and voting which go with such an appointment.

Today the majority of directors of physical education have professional rank with voting privileges on the faculty body. On the other hand, there are directors today who are directors without the rank of professor, associate or assistant professor, or even instructor, and in some instances they are not members of the faculty.

During the past decade there has been a very decided trend in the professional preparation of directors of physical education from one of medicine to one of education. There is a larger proportion of directors of physical education studying for the degree of Doctor of Philosophy or Education than for Medicine, which fact also indicates a change in our philosophy.

It is a significant and gratifying fact that deans of women and advisors of girls are now more fully cooperaing with and appreciative of the work of departments of physical education. At Columbia University (in the major for deans of women and advisors for girls)

Miss Sturtevant, in charge of this group, devotes a large portion of the course to health and physical education.

Perhaps the most outstanding evidence of the attitude of our colleges and universities towards physical education is the fact that physical education is practically a universal requirement. The requirement ranges from one to four years. The Bureau of Education Bulletin No. 14 for 1927 furnishes us with some interesting and significant figures. Out of 116 colleges and universities requiring physical education for women, twelve require one year; seventy require two years; seventeen require three years; and seventeen require four years.

By far the majority require physical education twice a week for at least two years. It will be of interest to this group to know that of the thirty-four colleges and universities requiring three or four years of physical education for women, twenty-two of these institutions belong to the Eastern Section of the United States. There is a tendency to increase the requirement in physical education. Mrs. G. B. Johnson, in her survey of the organization of the requirement of physical education for women in state universities, states that the majority of expert opinion favors the plan which provides for physical education four times a week throughout the college course. It is of further interest to know that of the 116 colleges and universities previously mentioned requiring physical education for women, eighty-four give academic credit ranging from two-tenths semester hours and thirty-two give no academic credit.

3. *Organization of Departments of Physical Education*

The organization of the department of physical education has changed in certain respects. There has been a differentiation of functions of the director or chairman of the department of physical education and the college or university physician. Although in several of our womens' colleges the college physician has been the designated director of physical education, this however does not represent a tendency. In fact the tendency is in another direction. The reasons for such an organization with the resident physician as director of physical education are clearly evident when one studies the local situations. Frequently the degree of M.D., of this nominal director, gives a certain dignity and prestige that the head actually responsible for physical education may not be able to match at least in letters following her name. And then again economic conditions make it imperative to reduce salary appropriations by appointing one head for the two distinct functions of college M.D. and director of physical education. Occasionally there is a lack of appreciation, understanding, and cooperation between these two responsible directors and the president attempts to solve the situation by placing one in a subor-

dinate position to the other. This type of organization is a relic of the early period. Modern organization recognizes this differentiation of function. It takes into consideration the necessity of the director of physical education having faculty representation, control of the budget and of staff appropriations. The college physician and the director of physical education both require specific training and experience, the one medical training and service, and the other physical education and teaching.

Internal organization of the department of physical education follows the trend in other college departments, namely: the passing of the one man or woman director, giving place to the committee type of department organization, with a chairman. Staff members share the responsibility for certain units. Because of this shared responsibility the director is usually a teacher as well as an administrator. This committee type of organization means growth of individual staff members, for with responsibility one reaches out for improvements, and one naturally becomes more interested in the results of one's own initiative. Much of the research and many of the special studies in our field have grown out of the opportunity such an organization affords. This is an important factor in creative teaching.

There is a most decided trend for departments of physical education to reach out into other departments in the college and organize cooperative projects. This is indeed a promising change from the old water tight compartment idea. The success of any department of physical education can be measured to a large degree by its ability to make use of all individuals, organizations and departments within the college for cooperative projects. From the beginning of the college year to commencement, cooperation with the medical staff and student health service is essential. The organization of the physical and medical examination or health examination required of all new students is an example of a cooperative project. Formerly the medical staff gave their examination, and usually at a later time the physical education staff gave their examination. The results were recorded and filed in the infirmary and the gymnasium respectively. Today the student reports for one examination, the medical staff and the physical education staff cooperating in such a way that time is saved the student, and findings are available for all concerned. Time does not permit an enumeration of all the interdepartmental relationships which we find in our modern department of physical education. The most outstanding are the student health service including the recent trend in this service, that of mental hygiene or psychiatry; personnel departments; and nutrition projects which include departments of physiology, home economics, chemistry, medical service and physical education. Such specialized projects as dance dramas or festivals afford an opportunity for cooperation in art, literature, and physical

education; and finally in the field of tests and measurements, the physical education department reaches out for guidance and assistance to the medical staff, to departments of anatomy, physiology, mathematics, education and psychology.

4. *Tests, Measurements.*

As yet there is scanty knowledge of the use of tests and measurements. The physical, medical, or health examination is the most universal test for classification in departments of physical education. Various changes have been made in this procedure which are indicative of certain trends. Freshman week is a modern institution; it has made it possible for examining physicians and departments of physical education to complete the entrance examinations before college opens. This means that no student participates in physical education activities before her capacities, needs, and interests have been determined, a very decided improvement over the old plan of continuing these examinations over the greater part of the first year and thus permitting students to participate in physical education activities before the completion of this examination. Too frequently this examination has been meaningless to the student, used merely as a protective measure rather than an educational opportunity. Even in our largest universities, this initial examination is organized as an educational factor. It means something to the individual. Follow-up examinations and conferences are held during the weeks following and in this way advice and guidance are given relative to efficient living in all its aspects.

Re-examinations have in the past been confined to those who have shown a marked handicap in heart, lungs, thyroid or nerve condition. Staff or schedule limitations made it impractical and impossible to extend the privilege of a thorough "follow-up" examination to all students. Departments of physical education have conducted examinations, postural and anthropometric for all students usually at the close of each year of required work in physical education. These examinations have been an attempt to measure achievement and do not meet the need of a thorough going health examination. Several colleges and universities give seniors a repetition of the entrance health examination. At Wellesley College such an examination is required of all junior students so that there is an opportunity for a follow up during the senior year.

The problem of the underweight and overweight students is demanding considerable time and attention among college students today. It is important that students be given accurate and scientific advice in this matter from the very start of their college experience.

The problem of posture is and doubtless always will be before us. Methods of recording and grading posture have undergone marked changes. However, the general procedure is to use photo-

graphs or some similar method of recording graphically the posture of each student. Those responsible for this work are impressed with the absence of false modesty in having these records made and the intelligent interest shown in postural difficulties. It is the personal opinion of many chairmen of departments of physical education that the posture of students entering college has improved. At least, high school students have been taught how and why. The majority can assume a good posture, but the problem of establishing good postural habits is still one of the objectives in physical education in colleges and universities.

Our examination records show a marked decrease in anthropometric measurements. This may be a blow to the statisticians but it is a decided advantage in the elimination of facts meaningless to the individual student.

We are very slowly introducing functional tests of physical fitness. The modified Schneider Test, breath holding, and a limited number of strength tests are the types given. The question of administering such tests has too generally seemed an impossible obstacle. We are in search of assistance in the determination of a valid test of physical fitness which can be given as an integral part of our classification examination at entrance. Dr. Howe has described the so-called triple test—a combination of the Schneider test, and tests of hemoglobin content and alkali reserve.

Motor ability tests are used for the classification of college and university students in physical education. An attempt is made to determine the ability of the individual in the so-called fundamental big muscle activities such as running, jumping, throwing, climbing. If a student fails such a test she is usually given a type of activity which will in a measure take care of this deficiency. Many of us assume that gymnastics with the use of apparatus selected for the exercise of those fundamental activities should be required of the group failing the motor ability test. We must be able to determine scientifically whether this assumption is correct. The effect of the various types of activity on the individual's efficiency in these fundamental motor skills must be studied.

Grading in physical education has very definitely been changed for the better. Formerly a student's grade was a composite of time serving and of docile obedience. Now with a new philosophy behind physical education, sincere attempts are being made to set up sound objectives and, in so far as is possible, employ objective methods of measuring each individual's accomplishment in the specific objectives we set up.

Miss Wayman has made a significant contribution in the field of achievement tests for college students. Our literature abounds in these tests and still we are searching continuously for something better

than we now use. We are measuring, we are handling large masses of figures, but as has been pointed out, we are too frequently absorbed in the statistical calculation to the exclusion of determining the true significance and meaning of our testing.

5. *Equipment.*

Our physical education equipment of today compared with that of twenty or thirty years ago shows certain outstanding tendencies.

In the first place, there is a tendency to have as much of our activity out of doors as is possible. This has meant a very considerable enlargement in playing fields. We have more tennis courts, our hockey fields have developed from the postage stamp variety into regulation sized fields. Basket ball is no longer confined to the gymnasium. Colleges and universities are setting aside more and more space and spending more and more money for out-of-door facilities.

Indoor equipment shows a trend from the construction of gymnasia with one large exercise floor to the modern building with gymnasia and supplementary rooms. With the emphasis on individual needs, the teaching units are smaller, and with the more varied programs, there are more classes. We find beautiful rooms constructed especially for dancing. The corrective gymnasium still gives a rather formidable impression, but at least a special room is equipped for individual work with examining rooms, dark room, and rest room adjoining. Would it not be possible for us to make our surroundings more beautiful, more pleasing, more satisfying especially for students who are handicapped?

The new gymnasium for women at the University of California, Berkeley, has succeeded in combining beauty with the needs of physical education. Many times the question is asked, "is it necessary to have such an unattractive room for physical education?" The day has passed when our walls must be adorned with Indian clubs, wands and dumb bells, pulley weights, nautical wheels, and a varied collection of ropes and whatnots, hanging from every steel girder. Apparatus rooms are now provided, and movable apparatus is out of sight except when in use. There is a tendency to use apparatus less than formerly as the over-emphasis on gymnastics has disappeared.

Locker and shower rooms have come out into the light of day. In the modern building they are usually on the ground floor with air and light. Showers are generally of the central control type, a time saver, and a hygienic improvement over the old musty dirty shower supplying a cluster of dark dressing rooms. With our emphasis on health protection there has developed the custom of supplying cakes of individual soap. It is to be regretted that our new shower rooms are littered from one end to the other with remnants of soap. A soap shower is necessary before entering the pool. For this reason we

must make some provision. Why not an improvement over the present wasteful use of soap? Liquid soap, while not wholly satisfactory, can be provided for swimmers. With the improvement in bathing facilities in our college houses, is it necessary to provide soap for other participants?

Gymnasia no longer merit the criticism of being unhygienic. Now that we have come up out of basements to the light of day and fresh air, the atmosphere of the gymnasium has changed. Good housekeeping is as necessary here as in all places where people gather. Matrons, not scrub women, are in charge of the locker, shower and dressing room units; intelligent, refined women who can greatly assist the department of physical education in establishing proper health attitudes and habits. Owing to the prevalence of foot infection, many colleges and universities are requiring all students to wear bath shoes. There is no question but that the use of bath shoes checks the spread of this infection. The serge gymnasium suit is a thing of the past. Some colleges and universities have been able to provide students with washable suits which are laundered by the department. This is an ideal system, but not always practical owing to climatic conditions which make the use of a warm jersey and bloomer necessary in many colleges and universities. It is surprising that more departments do not furnish and control the cleanliness of at least the undergarment as personal cleanliness is not by any means universally practiced among college girls. The gymnasium costume today not only has possibilities of hygienic treatment but it gives a freedom essential for participation. The disappearance of the very full pleated bloomer over the knee is practically universal.

Swimming pools are today considered a necessary part of the equipment of any department of physical education. The majority of colleges and universities have some facility for swimming and in these institutions the practice of having a swimming requirement for graduation is very common.

Facilities for golf and riding are also available in many of our colleges.

6. *Program.*

Along with the change in our philosophy of physical education has developed a program of activities suited to meet the capacities, needs, and interests of all college students. The elective system has taken the place of universal prescription. In addition to classifying students for light, medium, and regular activities, students may within these groups elect from a wide range of varied activity. Elective programs today include all types of athletic activities and games; dancing, interpretative, folk dancing, and clogging; tumbling; winter sports, and gymnastics of some kind—Bukh, Bode, Bertram,

Danish, Definite, Fundamental, or what not, and in many institutions, the less highly organized outing activities. Such a varied program makes us wonder why we should be troubled with undesirable concomitants.

In order to secure all the desirable benefits from free election within the light, medium and regular groups, several institutions require participation in an individual sport as well as in a team sport in order to enable each student to acquire a skill she can enjoy during leisure hours.

Few, if any, students are excused from the physical education requirement as departments are offering today, as never before, physical education suitable for individual capacity and needs. The understanding and excellent cooperation of our medical staffs have made this change possible. Students who are handicapped are made to feel a satisfaction and joy in accomplishing a variety of skills suited to their capacity. This is good psychology.

Competition has changed from intensive competition for the few to competition for all. Play days and intramural, interclass and informal competition are crowding out varsity, intercollegiate competition. Our varied programs have made it possible. Basket ball formerly was the *only* sport popular with college girls. Now hockey, lacrosse, swimming, baseball, archery, tennis, riding, and golf have their ardent enthusiasts. Outing activities and informal competition are popular with college students. It is an excellent project for the department of physical education and the Athletic Association to make such activity possible on Saturday afternoon, Sundays and holidays. Yet, it is alarming to see how many Athletic Associations feel they cannot make a success of anything on a Saturday afternoon.

Student leadership is developing with each passing year. We have not, however, developed this phase of cooperation far enough. The excellent work of our Athletic Associations and the A.C.A.C.W., the Athletic Conference of American College Women, is outstanding evidence of the faith and opportunities we can place in the hands of our students.

7. *Hygiene or Health Instruction.*

May I emphasize the general dissatisfaction on the part of all concerned with our required courses in hygiene. Several surveys have been published covering current practice, the most recent being that of Dr. Storey of Stanford University. As a result of this survey Dr. Storey states that "the great majority of the institutions of higher education in the United States are not furnishing opportunities for a competent general education in hygiene to the young men and young women who pass through them on their way to responsible citizenship."

There is considerable difference of opinion as to where the responsibility for the instruction in hygiene should be placed. The general trend seems to be to place it in the hands of anyone who is willing to take it;—Somewhat analogous to the selection of our Sunday School teachers—anyone who is willing to go to church every Sunday. Specific training for such teaching is absolutely necessary. It is only recently that this subject has received any attention on the part of colleges and universities in their courses for the preparation of teachers. The general medical or physical education courses do not as a rule give adequate training for this teaching. It is generally admitted that specific preparation is essential before we can hope for successful results from our required courses in hygiene in the way of sound information, satisfactory attitudes, and health habits relative to personal and community hygiene.

Courses in hygiene show an improvement in the fact that small discussion groups have supplanted the large lecture groups.

It appears increasingly essential that we organize our health instruction so that students can react in situations in which they themselves can enjoy and appreciate the application of the principles of hygiene. Participation in physical education activities offers an opportunity for motivating this subject. The satisfaction which comes from the success in accomplishment makes physical fitness a worth while objective. This means of motivating has been especially recommended for secondary schools. As long as our college students enter college with an alarming lack of health knowledge, would it not be feasible to give this method a fair trial. Health conferences are most effective when there is some already existing contact between student and teacher as for example, the department of physical education. At best success in hygiene instruction in the secondary school, college or university must be a cooperative project.

8. *Summary.*

To summarize: The outstanding modern trends in physical education for women in colleges and universities are to be found in, the philosophy of physical education, the attitude of college administrators, department organization and leadership, tests and measurements, equipment, programs and health instruction.

Selection and Guidance of Students who Wish to Undertake Professional Training in the Field of Physical Education

By Rosalind Cassidy
Professor of Physical Education, Mills College, California

THE modern scientific studies in psychology, sociology and other fields have increasingly impressed us with the great need for the wise guidance of the individual into his life work. The development of the field of vocational guidance has been rapid in these last years. The field of physical education is now being challenged from many sources to establish for itself sound guidance principles.

We who are working in this field, especially those who face the problems of teacher training, continually see the need to advise the best type of person into physical education and the poorly qualified person out of it, both for their own satisfaction in their work and for the good of the profession in general. We need an increasing number of well qualified persons entering the field of physical education in order to lower the present professional mortality rate with its attendant problems of personal ill adjustment and economic waste.

How may the teacher training institutions approach this vocational guidance problem? First we must ask ourselves:

Do we know what the physical education "job" demands?
Is our training based on such a job analysis?
Do we know what kind of person the "job" demands?
Have such traits studies been made in physical education?

The outline of such a study which is now being carried on in the State of California is given as a suggestion for procedure:

PROBLEM SET BY STATE DEPARTMENT OF PHYSICAL EDUCATION

Chairman, Rosalind Cassidy, Mills College
High School Preparatory Program for Physical Education Teachers and Recruiting Scheme

First Step: A job analysis of the profession of physical education teaching should be made (for both men and women) by an expert.

Second Step: Upon this analysis the problems may be worked out.

PROBLEM A

To set up a high school preparatory course for those who wish to be teachers of physical education. This course to be arrived at by three steps.

1. By study of the profession.
   Demands of the State credential.
   Requirements of major courses in the training institutions.
2. By study of courses offered now in high school.
3. By selecting such high school courses as are now offered and suggesting if necessary additional ones which will lead up to the required courses in teacher training institutions.

PROBLEM B

Recruiting scheme or guidance into the vocation of physical education teaching. Effective vocational guidance to be arrived at by:

1. Urging high school teachers, deans, advisors, and principals to guide those especially fitted for the profession of physical education into this field and those unfitted for it, out of this field.
2. Putting into the hands of this group specific information to enable them to do effective guidance into the profession of physical education.

Means of Accomplishing First Step

1. Print an informative booklet for counselors and for high school students. This would contain:
   a. Analysis of the profession, opportunities and salaries. Demands of the profession.
      Recommends preparatory courses in high school and college. Credential requirements. Institutions that give training.
2. State Supervisor at Institutes, principals' meetings, vocational guidance conferences, etc., emphasize the use of this material.
3. Use of State Newsletter to get the physical education teacher in each high school to hold a guidance conference in physical education in the school or talk on the subject in assembly.
4. State Department incorporate the main points of the booklet in an article and have it printed in the high school papers.
5. Educate parents to the values of this profession by means of articles in national magazines, and speeches at parent teachers association meetings.
6. State Supervisor to put the plan and content of the job analysis booklet before counselor meetings in all cities where there is such a system.

The vocational guidance groups in city school systems would welcome authoritative data from our field and would be glad to print it as a part of their counselling system if we could supply it. What they need to know is:

What sort of persons make successful physical education teachers.
What sort of professional training is needed.
What opportunities the profession offers.
What salaries the profession offers.
What credentials the state asks of the teacher.
What institutions give professional training.
What high school preparatory programs are advised.

In this problem of selection of major students and requirements for entering the field the committee of the Conference of Institutions giving professional training in physical education made up of Professor La Porte as chairman, Miss McKinstry and Miss Park, set up the following as essential:

A preparatory course in high school.
A written recommendation submitted by the director of the high school physical education department.
A series of ability and efficiency tests to be given at time of entrance.
A standard intelligence test.
A thorough physical, medical and health examination, with careful follow up.
A probationary period for a minimum of one year.

Such entrance requirements have become almost essential in California now that the state has refused to give credentials and has put the recommendation for credentials entirely upon the training institutions. It also rates the training institutions upon the success of the teachers it recommends. Such a method tends to do away with a shifting by the department of the responsibility for the major student who may work for credits with no assurance of a recommendation for a teaching position. Every major now given a credential in California is vouched for by the training institution. The questions that we may ask to clarify these problems are:

1. *Selection of Majors*:
   In what year do you begin the major course?
   What is the latest year for the entrance of students in the major course?
   Do you receive recommendations from high school physical education teachers?
   Do you instruct high school departments in the qualities you desire in majors?
   Do you send back reports on your physical education majors to their preparatory school?

II. *Standardized requirements for students entering the field of physical education*:
   Have you the right in your institution to refuse to accept a major?
   On what grounds do you refuse a major or advise her out of the field?
   What tests have you set up to determine the probable success of persons who wish to major?
   What methods do you use to get especially desirable students into your major training course?
   Would a standardized set of requirements for entrance to physical education training be desirable?
   Have any such requirements been set up? What are they?

What now of the guidance of the student after she has been accepted as a major? Let us start with this list of questions:

Do you have advising conferences with your majors?
Are these individual or group conferences?
What record blanks do you use in these conferences?
Do you send lower division majors on field trips?
Is there a follow up report or analysis discussion of these trips?
Do you use any self rating scheme with your students?
How many hours scheduled advising do you do each semester with each student?
Do you do any guidance in the first placement of majors for teaching?

We have felt in our institution an increasing need to clarify and

interpret to major students the demands and the possibilities of the teacher of physical education. We have used several methods to approach this, all of which are centered in a department conference meeting. The questions we clarify with the freshman majors at this time are:

Who should go into the field.
What the field offers you.
What this department can offer you.
What this department asks of you.

At this meeting we discuss our plan to have the beginning major visit various kinds of physical education plants to observe the teacher, the situation in which she teaches, the demands of the "job," etc. They are scheduled for these visits, and make a written report upon them.

The rating blanks are filled out at this meeting. One is kept by the student for her own self rating, one filed in her folder in the office. These are given a group rating by the staff and serve as a basis of conference with the student at the end of each semester.

These rating blanks have space on them for the budgeting of the time of the student in various activities during her four years. This is a guidance scheme to help the student in a wise distribution of electives and a well rounded plan for emphasis on motor skills.

In this conference we give the student a blank which shows her various fields within physical education toward which she may specialize. Listed under each of these are the contributing courses in art, literature, music, philosophy, sociology, psychology, etc. This blank serves as a guide in choosing her elective courses. The emphasis here is put upon a broad cultural background.

We have in the last few years put especial effort in the theory courses to have the students make speeches in presenting their reports or even their examinations instead of continually expressing themselves in writing. This gives them practice in thinking clearly and expressing themselves clearly in speech—an ability which they need so much in their field of work. This experience in speaking gives them an opportunity to decide on the elements that go into a good speech, the elements for judging a good speech, and the like. Group criticism based on these elements is given to help each speaker.

A guidance scheme that has been helpful to seniors in their practice teaching is a rating scale for practice teaching. The students filled out their own rating chart and compared it with the composite rating of their supervising teachers. This comparison helped them to develop fair judgment and to recognize their own particular needs. Space does not permit the inclusion of the various rating and guidance charts that have been discussed.

The Precision and Validation of Tests of Physical Fitness

By Eugene C. Howe
Professor of Physiology, Wellesley College

It has been said that during the past fifty years physical culture became transformed into physical training, and the latter into physical education. Each change in name took place when a new and wider significance became apparent in this field of teaching. The second transformation into physical education coincided roughly with the revelation that the leader of physical activities was concerned with mental and moral as well as with muscular development. But the pages of physical education literature are no longer filled with high sounding expressions of mental and moral objectives. We have shifted to the crest of another educational wave and are revelling in the application to our special problems of methods of measurement evolved by the psychologist and statistician. The pages of our literature are full of mathematical symbols that would have been distressingly perplexing to the gymnasium teacher of a generation ago. I propose in this paper to discuss a few fundamental points which, it seems to me, are frequently overlooked in the hasty and wholesale appropriation of measurement method that is now taking place in physical education.

Precision of Measurement

Many of us have the idea that a measurement such as that of a standing height or a blood pressure is either right or wrong. No measurement is "right," or rather, if it is, we have no way of knowing it. One smiles to think of the thousands of freshmen in elementary chemistry who have been directed to weigh out *exactly* five grams of sodium chloride. The scientist does not delude himself with any impossible idea of *exactness* of measurement—he aims to analyze his errors, define and determine the degree of *precision* of his measurement, and discover the effect of this degree of precision on the precision of his computed results.

Errors may be classified as follows:

1. Instrumental errors.
2. Residual errors.
3. Personal errors.
4. Errors of method.
5. Errors of validity.
6. Accidental errors.

In our work, instrumental errors are the easiest to account for, but nevertheless are frequently overlooked. Measuring sticks, calipers, tapes. balances, monometers, stop-watches are often allowed to go

to seed. They can easily be calibrated and errors of serious magnitude eliminated. That is to say, they can be made to approach an accepted standard so closely that the amount of deviation from that standard is negligible in comparison with other kinds of errors. The errors that remain after careful calibration are called "residual" and are negligible.

Personal errors arise from personal peculiarities and defects, such as sluggish and negative reaction times, visual abnormality, atoxic conditions, etc. They are best avoided by barring such persons as observers.

Errors of method result from using an instrument under conditions for which its readings are not standard. For example, measurements made with a steel tape on a cold day—temperature, say, 32°F, differ by about 1.5 per cent from the same measurements made on a summer day—Temperature 86° F.

Errors of validity result from unknowingly measuring the wrong thing. For example, the reading of a monometer may be contributed to by back pressure from a narrow and wrongly adjusted cuff, the measurement of a body girth or diameter may be that of bony structure plus muscle, fat and skin, and the measurement of oxygen consumption may be invalidated by inequality of lung volume at the instant of beginning and ending the experiment. They can be corrected by measurements made (in the above instances) on an artificial artery or lung, and by comparison with x-ray dimensions, respectively.

Accidental errors are those arising from normal human imperfection. It is impossible for an observer to obtain consistently duplicate readings of the same measurement if the units used are sufficiently small. For example, one could measure the length of this table with a decimeter stick to the nearest decimeter and obtain the same reading on any number of trials. Probably the same would be true if the readings were made to the nearest centimeter, and, if great care were used, to the nearest millimeter. But, if measuring to tenths of millimeters were attempted, identical readings would be scarce. The deviation from the mean would be equally distributed above and below the mean and would conform to the law of chance. The reliability of any single reading would be indicated by the "average deviation from the mean," and the reliability of the mean itself by the average deviation from the mean divided by the square root of the number of observations. All other kinds of error can be reduced to the level of negligibility in comparison with this kind, and when they are so reduced the above value ($A.D.=\frac{a.d.}{\sqrt{n}}$) becomes the "Precision Measure" of the observation in question.

After all sources of error have been accounted for, physiometric

and somatometric measurements are still subject to more or less uncontrollable fluctuations due to the complexity of conditions to be controlled. Some of these conditions such as those relating to the subjects' environment and activity are more or less easily controlled —e.g. external temperature, diet, digestive processes, diurnal cycle, exercise, rest, and fatigue. Others are more difficult to maintain constant—those having to do with mood, interest, attention, and the complex web of physiological function. The beginner is prone to confuse variations in test readings arising from accidental sources with those resulting from controllable conditions and uncontrollable natural physiological complexity. For example, when Schneider readings on the same individual vary from 8 to 16 in the course of a week there is a tendency to lay the blame on the inadequacy of instrumental technique and on the general cussedness of Nature, instead of uncontrolled conditions of temperature, digestive processes, diurnal cycle, fatigue, etc. Of course, if the circumstances under which the work is done make the control of these conditions impossible, one must not be discouraged if the results have only a very approximate signification, and under such circumstances, since the uncontrolled conditions are producing such wide variations in the results, the instrumental precision need not be refined. In somatometric measurement, a high degree of precision in instrumental technique is possible, and conditions are easily controllable. Lack of objectivity and reliability here is due to blind carelessness.

Much time and ink is wasted in expressing results in figures that seem to indicate a higher degree of precision than the precision of the measurement warrants. The three interchangeable measures of precision of data subject to accidental error are (1) A.D. (= average deviation from the mean divided by the square root of the number of observations); (2) P.E. or Probable Error (a value above and below the mean, such that the chances are 50-50 that the true value of the mean lies within or outside the limits of the Probable Error); (3) Sigma or Standard Deviation $\sqrt{\frac{fd^2}{n}}$. Nothing is gained by carrying any precision figure to more than two significant figures.

For example, suppose a measurement of stature, 161-23 cm. has a Precision Measure of 0.56 cm. This means that the first decimal place is doubtful by 5 units, the second by 56 units, and that the third would be doubtful by at least 560 units, an amount that would make this place entirely useless. Furthermore if the first significant figure of a Precision Measure is 7, 8, or 9, there is little use in using the second, since the corresponding place in the measurement would be doubtful by at least 70, 80, or 90 units. Similarly nothing is to be gained by recording the measurement itself farther than would correspond to the second significant figure of the Precision Measure.

Dipping into the literature at random I select a correlation coefficient recorded as 0.9205, with a P.E. of 0.01. This means that the second place in 0.9205 is doubtful by 1 unit, the third by at least 10, and the fourth by at least 100. The fourth figure is worthless and might as well not have been recorded.

Conversely, if the Precision Measure is stated to two significant figures, the measurement itself should be set down accordingly. For example a correlation coefficient is given as 0.66, P.E. 0.058. This means that the third figure in the correlation coefficient would be uncertain by 58 units, but since this place is left vacant there is no telling where the P.E. range stands. It may be 0.602 to 0.718, or 0.603 to 0.719, or 0.604 to 0.720, etc. If the third place is intended to be zero, it should be so stated.

In the above illustration the Predictive index is computed to 0.249, and in another case of a correlation coefficient of 0.71, to 0.249. Since the two "r's" are expressed to the second decimal only, only a specious appearance of precision and erudition is given by carrying the P.I. to three places. Time and space should be conserved by expressing them as 0.25 and 0.30 respectively.

A simple example follows: Suppose you are measuring height and chest girth and computing what has been called the Vital Index ($\frac{\text{c. g.}}{\text{Ht.}}$). You first determine by a series of measurements made under as nearly uniform conditions as possible, the average deviation from the mean in both these measurements. You then divide these average deviations from the mean (-a.d.) by the square root of the number of observations ($\frac{\text{a. d.}}{\text{n}}$ -A.D.). Suppose 100 $\frac{\text{A. D.}}{\text{Ht.}}$ is 1.0 per cent and 100 $\frac{\text{A. D.}}{\text{c. g.}}$ -1.0 per cent. It can be shown that the percentage precision of the Vital index is 1.7 per cent. Now take the Ponderal Index $\left(\sqrt[3]{\frac{\text{wt.}}{\text{Ht.}}} \right)$. If the percentage precision in these measurements is also 1.0 per cent each, the Ponderal Index itself has a precision measure of only 1.1 per cent. Obviously it is important to know that the Ponderal Index is more precise than the Vital index even when all the measurements concerned are uncertain in the same degree.

Validity

Validation is the first essential in the standardization of any test. It goes without saying that this group understands the full significance and the limitations of validation. But I am going to suggest some of the misunderstanding which I believe exists here and there among the rank and file of the profession.

Webster defines "valid" in two ways: (1) "Founded on truth or facts"—(2) "Capable of being justified, supported, or defended." The first definition suggests an absolute basis of validity—some kind

of scientifically divine revelation. The fact should be emphasized that all validation is *relative*. The criterion on which validity is established is always more or less unstable. Its stability depends on the diverseness of the elements it contains, and whether the latter are considered as fixed and measured during a short time range, or whether they are considered in the light of their potential improvement. The degree of inclusiveness of the criterion is determined partly by the nature of the quality complex to be measured, partly by definition. For example, "physical fitness" is necessarily an elaborate concept. It includes (1) the negative element of freedom from disease and defect as directly observed and as inferred from sickness records; (2) longevity; (3) organic soundness; (4) and motor ability (including posture), since this subquality is itself a factor in fitness in its broadest sense, and since it is prerequisite to enjoyed and therefore regular habits of exercise, and the latter in turn, to organic soundness and perhaps longevity. If we say a test is valid when it "measures what it purports to measure, then it must measure all of these subqualities. But a criterion embracing such a wide range of subqualities would be very difficult to establish objectively. It may be suggested that we omit the prophetic implications of the test and restrict the criterion arbitrarily, by definition, to organic endurance objectively measured by speed of performance in prolonged effort. But this introduces the uncontrollable condition of interest and attention and would be a dangerous procedure in any event except with trained athletes whose fitness is too obvious to need testing. The last resort is judgment ratings by "competent" observers, based on observations of behavior in various activities over a period of time, or such a judgment rating very circumspectly combined with performance ratings. In the last analysis, then, our "objective" test derives its validation to a large extent, paradoxically from a subjective criterion. It is the difficulty in establishing the criterion that makes the search for the predictive fitness test so baffling.

Motor ability is a somewhat more restricted complex, but nevertheless includes logically coordination and strength as exemplified under conventional gymnasium conditions and those qualities as they appear in practical every day motor habits.

Athletic ability is still simpler. Here the criterion can be largely objective, since it can be made to consist of a composite of properly weighted scores of performance in all athletic events. The choosing of the test whose elements are identical with the elements which make for success in the athletic events themselves is entirely an empirical problem. A high correlation is usually easily obtained because the measurements correlated are directly, simply, and inevitably connected like weight and volume of homogenous bodies, or multiplier and product in a multiplication table. The correlation has no funda-

mental or revealing biological significance. Such a test is virtually an athletic meet in miniature. Most ability and achievement tests are of that character—short cut devices—invaluable in mass education, but possessing no extraordinary potency by virtue of the reams of picture puzzle mathematics that go into their standardization.

In the complete process of validation of a fitness test a larger part is played by the preliminary analysis and selection of functions which *should,* in the light of our knowledge of normal physiology, underlie fitness and endurance. The classically known facts of the physiology of exercise, and the recent work of A. U. Hill provide a basis for analysis and selection. For example, we know something of the physics and physiology of heart and vasomotor function, of the physics and chemistry of the transfer of oxygen and carbon dioxide, of the thermodynamics and mechanics of muscle action, and of the norms of nutrition and metabolism. From such knowledge obtained from experiment on the lower animals, comparison of structure of closely related varieties of animals with different activity habits, from human experiments and autopsies, norms of optimum function can be inductively formulated. Further investigation can be made in the application of these formulae to athletes of obvious fitness and indestructibility to ascertain the quantitative character and relationships between the various respiratory, circulatory, and metabolic functions during rest and at the extreme limit of endurance.

Picture this procedure thus far as analogous to drilling a tunnel into one side of a mountain. It is the usual engineering practice, I understand, to drill from both ends simultaneously toward the center relying on the correctness of mathematical computation to bring the two borings together in virtually exact alignment, even though their starting points may have been miles apart. The other half of *our* tunnel is the establishment of a criterion as objective and inclusive as possible. Since we have no exact geometric and geodetic principles to predict an exact fit between tests and criterion, we may put through preliminary borings in the way of the application of the tests to small groups taken from the very top and the very bottom of the fitness scale subjectively judged. Subjective judgment of extremes is more correct than judgment of intermediate group. Tests showing the smaller percentage difference between fit and unfit may be discarded. This may be regarded as a presumptive validation. Finally the two halves of the tunnel are brought together by correlation between test and criterion using a large unselected group. A low correlation does not tell which end of the problem is faultily conceived. A high correlation indicates that the chances are largely in favor of sound reasoning at both ends of the problem, and is a revealing measure of fundamental relationship between function and performance.

In closing I will refer briefly to an effort made by Miss Miriam Taylor in our laboratories to carry deeper one line of functional testing and to connect it to some kind of criterion. Part of our test was the familiar Schneider point system of scoring cardiovascular efficiency. To this we added a determination of the hemoglobin content of the blood and an indirect measure of the blood's alkali reserve. I will not go into detail in regard to our reasons for stressing the hemoglobin and alkali reserve determination. Suffice it to say that a high score in both is a factor not only in an increased oxygen utilization, but in retarding the accumulation of lactic acid and the increase in hydrogen ion concentration, and in extending the tolerable limits of oxygen debt.

The hemoglobin determination was made with a Dare hemoglobinometer, and the alkali reserve, with the Marriott apparatus for measuring the tension of CO_2 in the alveolar air.

The three tests were combined both in the form of an unweighted product and a weighted mean—we called the combination the "Triple Test."

By way of criterion we used the personal judgment of the instructors in charge of the regular physical education activity of the various subjects, of whom there were a hundred. Judgments were given as Excellent, Good, Fair, and Poor. It was impossible in the time available to go further in establishing an objective and inclusive criterion. Our immediate object was to inter-correlate the parts of the test and make soundings in the direction of an eventual complete attempt at validation.

A table of correlation follows:

	r	P.E.
Instructor's Estimate with		
Motor ability (weighted)	0.64	0.05
Schneider score	0.68	0.05
Multiple Triple Test	0.69	0.04
Weighted Triple Test	0.73	0.04
Motor Ability Test (weighted) with		
Instructor's Estimate	0.64	0.05
Schneider Score	0.37	0.07
Weighted Triple Test	0.51	0.06
Schneider Score with		
CO_2 Tension	0.69	0.04
CO_2 Tension x Hemoglobin	0.74	0.04

The results would seem to imply that whatever contributes to proper nourishment and training of heart muscle also builds up a superior alkali reserve and favors a high hemoglobin content. On the whole one is tempted to interpret the results as tending to confirm the Schneider scoring method. We intend to continue this line of work laying stress on strengthening the validating criterion.

What to Measure in Physical Education

By Agnes Wayman
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According to Mr. Edison, we don't know one millionth part of one per cent about anything. Having been interested in this particular field for a number of years, knowing only a little about this field of Testing and Measuring, I, nevertheless, know enough to know that he is correct. I am quite willing to agree with him. Someone has facetiously stated that an expert is one who knows more and more about less and less. The more I think and read about this subject, the more I realize that according to that definition I am, in truth, an expert. I dare present this paper to you only because I feel just as I did when, several years ago at successive annual meetings of the College Directors' Association, I presented to them the extremely amateur work I was then doing in the field of testing and measuring. Someone must make the break. The subject is new in its application to Physical Education—we learn by trial and error. The more trials there are the faster we should learn.

In this paper, I have attacked the subject from the *whole* field of Physical Education in its *broadest* sense and not just from the activities or any special standpoint. That is important to keep in mind.

Why should we test and measure? We test and measure so that we can *rate* an individual, a class, an institution, a skill, a performance, a condition—anything; and we rate for purposes of comparison, classification, improvement, etc. We measure because we want to test not only the individual, but to find out, *objectively* if possible, the adequacy of our program and methods. This quite naturally must include our equipment and the teacher. So, for that reason, in my suggestions I have included all of these.

Before we can get very far in our efforts to test and measure we shall have to understand more clearly just what we mean by certain terms which are being more or less loosely used at present. For instance, we can't get very far in any discussion concerning motor ability or physical ability or physical capacity until we agree as to just what each of those terms means. At present we are very much in disagreement. One says a motor ability test is a test of "native ability" and should never be used in testing achievement. What do we mean by "native motor ability"? Is it possible ever to catch it when it has not been influenced at least a little by the learning process? After all, have we any real intelligence tests? Do they actually test brain capacity or merely various kinds of learning?

And so I say, first we shall have to define and agree upon the mean-

ing of motor ability, physical ability, physical fitness, physical capacity, physical efficiency, proficiency, etc. What is the difference between testing and measuring? What is the difference between achievement and accomplishment? Is there any? Is there a physical capacity and a motor capacity? Do the two together determine an individual's physical efficiency? Is physical capacity to the body what intelligence is to the brain? I, for one, would like to know. It will be difficult to proceed intelligently with the construction of tests and measurements until some of these questions are settled.

For many years there has been interest in methods of rating and in various kinds of rating schemes. In 1861 Dr. Hitchcock, of Amherst, began work in the field of anthropometry for rating purposes. Annually between 1861 and 1901, according to Bovard and Cozens, he published anthropometric tables of Amherst men, until finally, given his age and height, he had tables to show what the average college student should expect to measure, weigh, blow, push, lift or do, provided he wished for the *"mens sana in corpora sano."* He was able to furnish each student after his first physical examination with a chart "by which he may know at a glance whether he is at, near or below his estimated average so far as measurements, tests and examinations will show."

The early ratings seem to have been mostly anthropometric in character, Hitchcock and Sargent being the outstanding names in this connection. Then followed the era of strength tests, and we hear of such men as Sargent, Seaver, Savage, Kellogg, and Martin, who classified men according to strength and weight. During that time interest shifted to the cardiac functional tests of general condition and fitness, especially for athletic competition. These tests take into account heart rate and blood pressure and we hear of Crampton's "Blood Ptosis Test" in 1905, McCurdy's "Condition Test" 1910, Meylan's Test 1913, Foster's Test 1914, the Barach Test, "The Energy Index, 1914, the Barringer Test 1916, the Schneider Test 1920, the Pulse Rate Test for Physical Fitness, Michigan 1920 (for boys and girls), and the Pulse Ratio Test, Campbell, 1925. Beginning about 1924, Collins and Howe, of Wellesley, employed certain physiometric tests and somatometric indices in measuring physical fitness and efficiency.

As early as 1894 attention was being turned to the motor side of the problem. At that time the normal school of Gymnastics at Milwaukee was attempting to measure student ability in nine events.

In 1904 Meylan, of Columbia, began to develop comprehensive tests utilizing the elements of running, jumping, vaulting, climbing, etc. By 1916 testing individuals according to the elements involved in play was universal, again quoting Bovard and Cozens.

Beginning with 1908, we read of physical ability tests, efficiency tests, tests for "all-round" efficiency, average records for boys and

girls as a result of certain playground efficiency tests, individual scoring systems for athletic events, Athletic Badge Tests, Physical Education Efficiency Tests for Grade Schools on a basis of age, height, and grade; in 1914 the Detroit tests and "age-aims" tests of Stecher of Philadelphia, the New York Physical Ability Test, the Decathlon Test in California under Hetherington, and later Stolz; "Rational Athletics for Boys and Girls" by Reilly, Tests of Physical Ability by McCurdy of Springfield, Maroney of Atlantic City, and R. K. Atkinson of the Russell Sage Foundation. The Wayman tests for Physical Efficiency came in 1923; these tests voiced a new principle in that they attempted to define physical efficiency and in order to measure it proposed a battery of three tests designed to measure (1) physical fitness, (2) physical capacity as evidenced by certain strengths and vital capacity, and (3) motor ability. At about this time, we find Miss Alden of the University of Oregon, employing a self-testing program and giving proficiency ratings on the basis of skill.

In 1913 Meylan sounded an interesting note by dividing his Proficiency Tests for Freshmen and Sophomores into four classes:

a. *Subjective* body control—including under that, posture in standing and walking.
b. *Objective* body control—control of the body on the ground, above it and in the water.
c. Knowledge and appreciation of games, formation of habits of exercise.
d. Knowledge of the principles of hygiene and sanitation as a basis for intelligent care of the body.

We find at this time much emphasis being placed in the testing upon physical proficiency, physical ability, agility, gymnastic ability, and the employment of groups of tests *progressive* in difficulty—in swimming as well as in land sports.

In 1924 McCurdy as Chairman of a committee on Motor Ability tests brought out a series of tests designed to measure skill in the *elements* of such games as football, soccer, field hockey, basketball and tennis.

Rogers, in his "Physical Capacity Tests" in 1925, proposes certain physical capacity tests and offers proof that such tests are also a measure of athletic ability. He then assumes that a measure of muscular efficiency is also a measure of physical fitness, mainly because "the chief method of improving physical condition in school is through muscular activity."

Probably the latest work is Brace's on "Measuring Motor Ability," in which he suggests a scale of motor ability tests designed to test pure motor ability.

In order to show you what confusion there is in the field at present, as well as to indicate the variety of approaches being made, I have compiled a list of the various kinds of tests of which I have found mention and which includes:

1. Anthropometric tests
2. Strength tests for physical capacity and efficiency.
3. Cardiac functional tests
4. Physiometric tests
5. Blood ptosis tests

6. Physical condition tests
7. Physical fitness tests
8. Physical ability tests
9. Efficiency tests
10. All-round efficiency tests
11. Physical Education efficiency tests
12. Physical efficiency tests
13. Skill and its elements—tests
14. Proficiency tests
15. Motor control tests
16. Height—weight—age tests
17. Neuro-muscular control tests
18. Physical capacity tests
19. Achievement tests
20. Accomplishment tests
21. Vital efficiency tests
22. Endurance tests
23. Motor ability tests
24. Organic efficiency tests
25. Health knowledge tests
26. Play interest tests
27. Social attitudes tests
28. Character tests
29. Conduct tests
30. Habits and attitude tests
31. Sensory capacity tests
32. Practice tests
33. Athletic Badge tests
34. Organic functional tests
35. Placement tests

Then, in order to aid us in our problem or to confuse us still more, I made another list in which I endeavored to designate all the various things we are and have been trying to test and measure according to the authors of the various tests.

These lists are not parallel—that is, Number 11 on the second list is not what Number 11 on the first list is trying to test.

Purpose of the tests—to measure or rate

1. Physical capacity
2. Physical condition
3. Physical fitness
4. Physical efficiency
5. Skill—in general and particular
6. General condition
7. Speed
8. Endurance
9. Subjective body control—posture
10. Objective body control
11. Knowledge—applied to games and hygiene
12. Agility
13. Spring
14. Coordination
15. Balance
16. Accuracy
17. Athletic Ability
18. Achievement
19. Native ability
20. Improvement
21. For placement in class
22. Organic efficiency
23. Social attitudes
24. Character—moral growth
25. Habits
26. Skill in the elements of game
27. Sensory capacity

When I first started working on this paper, I thought it might be interesting as well as helpful to get the reactions to this subject of various individuals in the field of general education as well as in our own special field. I was both surprised and pleased to get most interesting responses from such busy people as Prof. Frank Lloyd of New York University, Dr. Jesse Williams of Teachers College, Dr. Ruth Strang of Teachers College, Dr. A. I. Gates of Teachers College, Philip E. Erwing of State Teachers College, East Stroudsburg, Pa., Dr. H. Hartshorne of Teachers College, Dr. E. L. Thorndike of Teachers College, Dr. Brace of the University of Texas, Frederick Cozens of the University of California at Los Angeles, Miss M. A. Delaney of Eastern High School, Detroit, Mich., and Dr. Charles H. Keene of the University of Buffalo, and others.

You may perhaps be interested in some of the suggestions made by

them, not only because they offer rich food for thought but because they show the present tendency in our thinking as regards this problem.

1. "We should test the whole of the individual; not only the ability to accomplish certain physical achievements but the student's progress and improvement physically; the general condition of the individual, i.e., presence or absence of physical defects, particularly of the removable type; and the attitude of the student toward things which are beneficial or otherwise towards health, i.e., her co-operation in health matters, we might even say, the quality of her citizenship as regards this important factor.

It seems to me, too, that any set of achievement tests which does not consider skills is folly and wholly lacking in appreciation of the educational phase of physical activity. I have definitely in mind here strength tests, under whatever plausible disguise they may appear. These tests have practically no relation to intelligence, or to general educational progress.

This brings up the point that in the long run, no measurement of physical education can stand in the program of general education unless there is some fairly close correlation between it and general scholastic progress, and I mean by this statement, scholastic record, not merely standing in the so-called intelligence tests (which, by the way, mostly do not test intelligence at all, but are tests of past experiences and, to some extent, of mental agility) i.e., measurements in physical education should be of such a type as to measure not only achievement of certain "stunts" or exercises, but also measure intelligence as indicated by the power to perform things requiring accurate co-ordination and also measure such important factors in success in life as diligence and application. Such exercises and tests have been devised and are being used in a few places."

II. *What to Measure in Physical Education*:

1. Native motor ability.
2. Achievement in physical skills,—for the purpose of determining
   a. Grades, marks, promotions, awards, honors, etc.
   b. Pupil progress. Brace makes a distinction between achievement and practice tests which should be taken into account.
   c. Classification of students.
   d. Teacher efficiency
   e. Diagnosis and remedial teaching.
   f. Motivation.
   g. For purposes of research and experimentation along many lines, particular to aid instruction.
3. Information acquired as to technique in various fields within physical education.
4. General information in the entire field.
5. Anthropometric measurements for the purpose of determining various growth conditions.
6. Strength—general bodily strength and strength of particular muscle groups.
7. General athletic ability (some may group this under 2, others as a separate item.
8. Cardio-vascular efficiency or physical fitness (this may or may not be grouped under physical education, according to the viewpoint of the individual making the classification.))
9. Physical activity habits and attitudes.
10. Posture and body mechanics.

III. "My only reaction to your suggestion of what to measure in physical education is that physical education should be regarded as one of the regular educational subjects. We, therefore, are called upon to determine something of the abilities and

capacities of students for taking this subject, to determine the achievement which they have made in every aspect of the subject included in our course of study, and to improve our teaching processes by experimental investigation and by the use of objective teaching devices. I believe that if anything is worth doing it is worth doing well and if it is worth doing it is important that we know how well we are doing it. As I see this problem our need is not to hunt around for things to measure, but to determine what we should teach and how much of it we should teach and then to objectively measure the extent to which we are reaching these goals or objectives which we have set up. The more objective our measurement, the more worth while. Perhaps the only excuse for making subjective measurement is that our technique for making objective or scientific analyses is at present deficient. By all means I believe we should keep our methods of measurement in this field comparable and equivalent to methods used in relation to other educational subjects. This in itself will serve as something of a guide as to what to measure and how to measure."

IV. "I have been thinking over a little the problem of what tests might be applied to measure physical education and feel that their number would be quite indefinite—almost unlimited. One could make a two or three page list of relevant material. It seems to me to be wholly a matter of what one really wants to measure.

"In a wholly different field are tests of play interests which conceivably might be affected by physical education. The best known of these is the Lehman and Witty Play Interests Test. I think this is not separately published but a great deal has been written about it. I think it will be published by the Association Press. Comparable material has been prepared by several others including Terman's students in connection with the Studies in Genius.

"Character tests are as yet very imperfect but enough has been done to show the way toward the construction of Conduct Tests which might be of interest to physical education and I should think some of the existing social attitudes tests might also prove important, particularly as these relate to changing attitudes or prejudices with reference to racial, national and religious groups among one's playmates.

"Of course, one of the outstanding problems growing out of the consideration of the character value of physical education is the probable transfer. We have little information on this subject already in print and I hope that in the near future experiments will be undertaken to settle the question of existing transfer and of the best techniques to employ in order to gain the most from physical education for moral growth."

V. Approaches the field of knowledge and proposes knowledge tests.

1. True false Test of Knowledge of the effect of exercise.
2. Tests of knowledge of correct form in sports.
3. Test of knowledge of best kind of exercise to take under certain circumstances.

VI. Suggests a slightly different emphasis. "Theoretically, for adequate classification, we should have a test or a battery of tests which will give us a complete statement of the student. Such will necessitate an index of menti-motor skills, of organic capacity and efficiency, an index of interpretative ability and capacity, and an index of emotional patterns and drives.

"In menti-motor skills we can theoretically test the efficiency of an individual in all skills. This, however, is obviously a very uneconomical process and we need a small group of tests which will be valid indices of the efficiency in all skills. Theoretically, we should also be able to measure menti-motor capacity. I believe, however, that the immediate problem is to measure present achievement.

"We know that in the intelligence field there is a correlation toward achievement and intelligence tests of about ninety which is high enough to indicate that achievement by itself is a sufficient measure and classifies as inadequately from the point of view of ability as does the intelligence test.

"We are on the threshold of organic classification and at the present time have no adequate tests. Whether this shall be general organic efficiency or a series of specific organic efficiencies will be determined by careful research. We need further to set up a correlation between degrees of organic efficiency and ability to perform. This has not been done to my knowledge."

At present there are those who believe that anything in our field should be reduced to measurement; there are those who do not believe in measuring at all; there are those who accept figures as the final word; there are those who refuse to believe in them or to be influenced by them. Of course, the pendulum will swing too far the other way before it strikes the happy medium in the testing process.

As I see it, the field of Physical Education can be twisted and measured from about six different aspects or phases, although there will always in all of the divisions and sub-divisions, be an over-lapping.

These six are:

I. The student
II. The instructor
III. The methods
IV. The tools
V. The results
VI. The over-head

Keeping in mind that there is always danger of over-testing or of putting too much emphasis upon the results of tests, nevertheless, I feel sure that anything which will make it possible for us to evaluate in objective terms each one of these phases in our field will make it possible for us that much sooner to improve our techniques, our methods and our learning, and our results in the whole field.

Next I took each one of these six phases and split each one up into many approaches. I will begin with

I. The student—who has been so far our chief concern in our testing and measuring. The student might be tested and measured from 12 different angles, and here we get into difficulties in classification unless we have agreed upon the meaning of the terms before mentioned.

A. Mental capacity
B. Physical capacity
C. Sensory capacity
D. Motor reactions and capacities
E. Knowledge
F. Habits and practices
G. Attitudes and appreciations
H. Interests
I. Capacity for leadership
J. Character—conduct—personality
K. Transfer of training
L. Service to the community

Under A—Mental capacity might be included

1. Intelligence
2. Mental soundness
3. Tests of emotions—fear—elation, etc.

Under B—Physical capacity

1. Physical fitness and health
   a. Organic efficiency
   b. Organic power
   c. Cardiac efficiency
   d. Mental condition
   e. Emotions
   f. Dosage of exercise—physiological
2. Posture and body mechanics
3. Vital capacity
4. Weight
5. Nutrition
6. Strength
7. Energy
8. Power
9. Endurance
10. Improvement in any or all

Under C—Sensory capacity

1. Visual
2. Auditory
3. Other senses
4. Timing
   a. Fly in baseball
   b. Tackle in football
   c. Dodging traffic

Under D—Motor reactions and motor capacities

1. Motor intelligence or motor educability
2. Native ability or rather general motor ability

speed	strength
accuracy	coordination
control	steadiness—balance

3. Motor achievement
   a. Special abilities
   b. Special skills
   c. Special techniques
4. Proficiency—in general or along special lines
5. Motor interest
6. Motor aptitudes
7. Motor adaptability
8. Motor-mindedness
9. For motor initiative or volition
10. Improvement—in general and in particular

It is in the motor field that we have probably done our most work, as this field lends itself more easily to objective tests and hence is easier to work with. Is motor ability to the body what intelligence is to the brain? Does a motor ability test give us a cross section of past learning in motor expression and a measure of an individual's capacity to achieve along motor lines? Should a motor ability test measure neuromuscular capacity just as an intelligence tests measures brain capacity?

For some purposes a small battery of tests which could be given quickly and which could be relied upon to predict would be most helpful and useful in classifying students. On the other hand groups of tests which occupy the students for some time are very useful as a program and are helpful in catching and developing the interest of students. For instance, the "Physical Achievement Tests for Girls and Women," issued by the Women's Division several years ago, which contained four groups of tests; a group of track and field events, a group of stunts, a group of team games, and a miscellaneous group containing walking, swimming and tennis. Of course, it was worked out on a point award basis, and the tests were designed "so that they could be used not only as a standard of measurement at any given time, but also as a program of physical activity and as a goal to work toward."

Under E—Knowledge. I have suggested

1. Regarding health and proper living—personal, community, mental and social
2. Of proper health habits and reasons for
3. Of first-aid
4. Of rules of games
5. Of safety under various conditions
6. Of proper form in games, athletic events, swimming, dancing, etc.
7. Of etiquette in certain game situations
8. Of team play and strategy in games or events
9. Of regulations governing meets, tournaments, etc.
10. Of duties of officials
11. Of physical activities and physical recreation in general, etc.

For instance we have the Gates-Strang Health Knowledge Tests. The Women's Division and the Women's Athletic Section of the A.P.E.A. have developed a scheme for rating basketball officials, which, of course, contains a knowledge test, etc.

After all, the test of any program or any scheme of education is

D—or Habits and Practices

1. Health (eating—sleeping—bathings, etc.)
2. Exercise and recreation
3. Moral
4. Improvement

For instance health teaching is successful only as it results in improved health habits among those exposed to the teaching. Required Physical Education is justified partially on the grounds that it results in habits of exercise and recreation. Does it? Are our basketball teams more moral or less so because of such participation? Can we test it and measure it and how?

My next sub-division is Attitudes and Appreciations.

When we talk about habits, attitudes, appreciations, interests, character, conduct and personality, there is such an over-lapping as to be most confusing. But at least we can keep that in mind. Says Dr. Brace in his paper on "The Measurement of Achievement in Physical Education," "We all know that achievement is not confined to physical skills. Successful teaching in Physical Education should result in achievement in the fields of attitudes and appreciations and knowledge."

Under this heading I have included

E—Attitudes and Appreciations

1. Appreciation of value of health
2. Appreciation of value of physical recreation
3. Appreciation of good sportsmanship
4. Appreciation of team play
5. Appreciation of value of acquiring certain skills
6. Appreciation of recreation and exercise
7. Appreciation of health and practicing health habits
8. Appreciation toward cheating
9. Toward winning
10. Toward intra- vs. inter-school competition
11. Toward playing with the "dub"
12. Toward team work
13. Toward "training" for competition and conforming for sake of all
14. Toward ways of spending leisure time
15. Toward awards and rewards

F—Interests

1. To determine in which fields her interests lie
   a. Theoretical
      i. Research
      ii. Teaching
      iii. Writing
   b. Practical
      i. Rhythm
      ii. Sports and games
      iii. Individual activities
      iv. Group activities
      v. Highly organized activities
      vi. Less highly organized activities
      vii. Indoor activities
      viii. Out-door activities
      ix. Formal or informal or natural
      x. Active
      xi. Passive

2. Within a given field—to determine her special interests, i. e.
   a. Track and field—which events
   b. Swimming—which events
   3. Rhythm—which type—tapping, clogging, folk dancing, natural, etc.

As examples of tests of Play Interest there are the Lehman and Witty Play Interest Tests. Is a girl and intro-vert or an extra-vert? Having found that out, what are we going to do about it in the Physical Education program?

As for my next division—Leadership—well, we may not employ cut and dried tests in this connection, but we certainly can employ situations, and according as the individual reacts to these situations we can rate her. I am sure we would include under this

G. Leadership
   1. Initiative
   2. Cooperation
   3. Quickness of decision
   4. Fairness of judgment
   5. Vision and imagination
   6. Executive ability
   7. Ability to get along with others
   8. Personal magnetism, etc.

H—Character and Personality, I shall merely mention. It is a fascinating but elusive field, which has scarcely been touched, difficult because it, too, does not lend itself to objective tests—hence unsatisfactory in results. How are we going to measure

   1. Honesty
   2. Loyalty
   3. Fair play
   4. Good sportsmanship
   5. Courage
   6. Unselfishness and various conduct traits

Hartshorne and May are working at it. We have Mendenhall's Character rating scale for grades 3 to 8; Upton-Chassell's scale for measuring habits of good citizenship; Lentz character tests. But we have only just begun and we might include under that heading—my next—

I—The Transfer of Training
   1. From game situations to other situations in life for after all, games and play are life.
   2. And under this might come motor transfer, or what Garfield calls "Motor Adaptability—capacity to solve motor situations and to make a new coordinated movement accurately."

II. The Teacher—If an institution is the length and breadth of one man, certainly, in Physical Education as in no other field, the pupils and the local situation reflects the teacher or the coach. It seems to me that the present unrest and dissatisfaction with academic programs in college is as much due to the weaknesses of the individual members of the teaching staffs as to the faults in the curriculum; just as graft and wrong doing in government is due to the individual officials. But both wrong situations go back to a wrong emphasis in the choosing of officials and a wrong emphasis in the selecting of faculties and administrative staffs in general. Certainly at least as much emphasis should be placed upon character and personality as is placed upon ability and capacity, mental

or physical. When the time comes that that is done, curricula will become more vitalized, class rooms will be productive of more creative thinking, and colleges and schools will be able to boast of more and greater productive scholars. What we need in all fields, but especially in the field of Physical Education is more *creative teaching.* That means more teachers with vision and imagination, teachers with dynamic personalities, teachers who can vitalize a program and a pupil, teachers who are interested in their profession and its advancement, teachers whose value is not measured by physical abilities alone, but by a keen intelligence and a broad general interest and education.

How are we going to measure individuals from that standpoint, both candidates for positions and teachers who are actually in the field? We all have our individual methods when interviewing a prospective instructor. We have certain ways of weighing and measuring a candidate, as it were. For instance, we want to know her philosophy toward play, toward strenuous competition. Does her attitude toward the principles and platform of the Women's Division make any difference to you? Or do you feel that that is her own affair, just as her politics are? I recently heard a head of a department voice those sentiments. How about it? The principles and ideals involved in the Platform of the Women's Division represent certainly the ideal toward which most of us are striving. It represents a certain sane philosophy toward the whole field and conduct of sports and games for girls. Regardless of her ability, isn't her philosophy along this line of vital importance in working out and applying programs for girls in an institution? Isn't her physical fitness and capacity, her character, her personality, her ability to teach the things she is expected to teach, her philosophy toward the whole subject of sports and games where girls are concerned, the qualities of leadership in her and her ability to develop potential leadership when she sees it; her vision, her imagination, her interests, etc.?

And finally, how are we going to judge of the success of that teacher? By what criteria? By her popularity with the students, by the championships her teams win, by the records her girls make or break, by the amount of work she does, or by the increase in interest among all of the students, by improvement in skills on the part of many, by improvement in health habits among the students, etc.?

Can these things be measured objectively, and, if so, how? And in the last analysis, do we want to measure them so? Harry D. Kitson, of Teachers College, in attempting to measure the "Interest of Teachers in Their Work," uses a ten-step scale ranging from 0 to 100. In measuring a group of 407 he found that the group at 100-90 measured 57% of the total. He had asked them to indicate length of service, and the test further showed that those who had taught longest were most interested. This is a subjective test and so subject to certain weaknesses.

If our students are interested, our teachers experts in their lines, and our results are negative, may there not be something wrong with our methods—and so I call the third big aspect lending itself to testing and measuring—

III. Methods.

1. Are they progressive or static?
2. Old or new?
3. Adapted to meet the situation or not?
4. Based on sound psychology or haphazard?
5. Do they place the emphasis upon the individual or the activity?
6. Upon improvement or achievement?
7. Do they provide for the mass or the experts?
8. Formal or informal?
9. Adequate?
10. Are they based upon fact?
11. Are they intelligent?

And now we come to my fourth large classification.

IV. The Tools (Program and Equipment). For this I have used the outline suggested by Miss McKinstry, who is Chairman of a committee which is working out a rating scheme for the Women's Division. The purpose of this rating scheme is to rate institutions and organizations on a basis of 1000 points according to—

1. Provision 2. Program 3. Promotion 4. Protection

Under 1. Provision for facilities, time allotment and adequate staff.
Under 2. Program, varied, comprehensive, educationally and recreationally of the greatest value to the greatest number.
Under 3. Promotion of such a program thru the right use of incentives, rewards, and publicity.
Under 4. Protection of all competitive and non-competitive activities for girls and women thru attention to

a. Physical examinations
b. Follow-up—especially of participants before games
c. Restriction of travel in competition by zoning
d. Audience restrictions
e. Standardization of costume and equipment
f. Standardization of rules for women
g. Establishing standards of sportsmanship

According to this scheme, a college or school or organization could be rated Class A, B, or C, depending upon the number of points it received out of 1000. Of course, the intelligent thing to do in any scheme of education is to first set up specific objectives. The measurement of the achievement of these objectives then becomes a measure of the success of the whole scheme, just as the measure of achievement of the student is to a certain extent a measure of the success of the teacher. And so I have called the fifth thing in Physical Education which lends itself to measurement—

V. The Results—or a measurement of the *achievement* of our *objectives.*

1. Is there improvement in *character* as a result of sports and games?
2. Is there improvement in *health* and *health habits* as a result of hygiene instruction and health education?
3. Has *good posture* come as a result of posture training, exercises, etc?
4. Has student responsibility resulted in *real leadership?*
5. As a result of required Physical Education have there come *habits* of *exercise?*
6. As a result of required participation in sports and games has there come a *joy* in *play?*
7. Has participation in an intelligent program resulted in equipment for a *wise use* of *leisure time?*
8. Is good sportsmanship in the field of play resulting in *fair play* in the *class room;* fair play at home, etc.

All of this which has to do with developing character, personality, manners and morals Dr. Hetherington calls "the over-head program" in Physical Education, and he would measure the worth of the over-head program on the social, moral and mental sides. So we might call our sixth division the

VI. Over-head Program—although in one way health, character, leadership, attitudes, etc., might be considered the "by-products" of Physical Education.

1. Mental 2. Moral 3. Social

Unmeasurable.

We know that health is not always a determining factor in success—either in game situations or in other life situations.

We know that many individuals possessed of the greatest of skill are not always the winners.

What is it that—everything else being equal—makes one girl succeed, another one fail? It is that intangible, elusive, unmeasurable something, that fourth dimension, as it were, call it will-power, spirit, heart, drive, courage, morale, grit, loyalty, whatever you will, it's the thing which some possess and some do not; it's the thing which drives frail bodies to great feats; it's the thing which keeps you moving and playing when legs are leaden, breaths coming in scorching, burning stabs, consciousness almost gone; it's the thing which carries you over the last long mile, up and over the last steep climb, the thing which takes us over-the-top. It is the unmeasurable quantity in an individual, and unless we can find a way of testing and measuring that unknown quantity, no tests for physical capacity, physical fitness, or motor ability will ever be quite adequate or conclusive.

And so I finish as I began, by saying—there is much to be done. Let us remember that no attempts at measuring are too small for experimental purposes.

To summarize—as I see it—the field falls into six approaches, each with many sub-divisions and phases—

I. The Student
II. The Teacher
III. The Methods
IV. The Tools
V. The Results
VI. The Over-head

I have added a number of reasons as to why we should test and measure. I will include them but not read them, unless you wish it, as time is short.

Reasons for Testing.

Tests tell us what to expect of an

1. Individual—his motor and physical capacity.
2. Enable us to group girls and boys for instruction purposes more intelligently according to past learning, physical abilities, physical condition, accomplishment, etc.
3. Enable us to group them according to limitations or possibilities, motor and physical.
4. To know whether an individual is working up to her capacity or not.
5. For purposes of grading.
6. For purposes of promotion.
7. To enable us to find out in a short time objectively what it might take months to learn by the older method of judgment of the instructor.
8. Test scores enable us to compare one group with another, one school with another.
9. Enable us to develop "norms" with which individuals, groups or schools may compare themselves—thus offering an incentive and stimulating interest.
10. Make it possible for us to evaluate instruction, instructors, programs, methods, with a view to improvement.
11. To fit the individual into the activity most needed, for her special needs—from the point of view of types of individuals—intro-vert, extra-vert, etc.
12. For the purpose of determining pupil progress.
13. Motivation.
14. To furnish practical means for classifying quickly individuals into groups for competition.
15. Lastly to furnish material for important studies and research; such as

    a. Do test results correlate with athletic ability?
    b. What is the correlation between the instructor's judgment and the test score?
    c. What is the correlation, if any, between the medical and the anthropometric, or the medical and the motor ability, or the anthropometric and the motor ability?
    d. Is there a correlation between physical condition and physical efficiency?
    e. What is the correlation between mental ability or intelligence and physical proficiency? Is there a correlation between intelligence and physical efficiency?
    f. Do high P.Q.'s coincide with high I.Q.'s? Do they correlate? Does the efficient mentality go with the efficient body in spite of a few exceptions?
    g. Is there any correlation between posture and strength, between posture and lung capacity, between lung capacity and height?
    h. Finally, what is the correlation between test results and practical life results, for that is the final test?

Basic Considerations in Planning the College Program for Women

By Ruth Glassow
Oregon Agricultural College

I. *Are We Ready for Requirements in Terms of Ability?*

TWO years ago at the annual meeting of this association, there was discussion which viewed with favor the advisability of dropping physical education requirements in college. Arguments said "forcing a student into an activity which she does not like will only increase that dislike; the large number of students in universities makes it impossible to know and to influence each woman; it would be better to have in our classes only those who are interested." That position is of interest because it expresses dissatisfaction with existing conditions. It recognizes a lack of appreciation for our work on the part of a large number of college students. Lowering or withdrawing of graduation requirements as a possible means of bettering the situation must be questioned. There is in that suggestion something of giving up the fight; something which says we have failed in what we hoped to do; let us now withdraw from the field; instead of showing college students how we may be of service to them, since they do not appreciate what we offer, let them come to us when they have discovered that they need help.

In place of that position, I would suggest that we study the physical education program: does it offer to the student something which she is likely to consider worthy of time and effort? In a study of the status of physical education in 182 American colleges and universities published in 1927 by the United States Bureau of Education, the author says regarding required work, "There is a general tendency toward requiring this work for two years and allowing four semester hours credit for it". (Physical Education in American Colleges and Universities, Bureau of Education Bulletin No. 14). Note the wording "requiring work for *two years* and allowing" credit for it. The author goes on to say "One of the most interesting developments in colleges at present is the requirement of ability to pass certain tests in swimming." Does this not present a true picture of the aims which we have set for college students; do we not say, "To meet our requirements you must pass the swimming test and take some kind of work three times a week for two years". Except for the swimming test all that is asked of the student is that she be present at the majority of the meetings of the class and that she indicate her worthiness to be passed in the course by impressing her instructor with her interest,

her effort, and her attitude. Mrs. Johnson in her study of "Physical Education for Women in State Universities", found that "general physical ability, attendance in class, and attitude toward class work" were the factors most commonly used in grading students in physical education. No means were suggested for measuring physical ability or attitude toward class work. "Posture judged by tests and estimates" was next in order of frequency of use; next was "character traits" (for which there were no suggestions for measuring); then, results of efficiency tests. In some institutions these tests had been devised for their own use; others used the Wayman Physical Efficiency Tests. Next in order of frequency of use were personal appearance, athletic skill, health habits, and ability in leadership.

Ten elements are listed as a basis for grading; of these, six—general physical ability, attitude toward class work, character traits, personal appearance, health habits, and ability in leadership—are measured only by the estimation of the instructor. There are then only four elements for which a means of measuring was suggested—attendance in class, posture, results of efficiency tests, and athletic skills. If we question the validity of using efficiency tests or the validity of the test itself only attendance, posture, and athletic skills remain as elements which can be measured. A rating which depends in so large a proportion upon the estimation of the instructor is not one in which the student can find stimulation. As a profession, we have failed in stating aims and in grading in a manner which is a challenge to the college student.

As one means of developing appreciation for the work offered by the department of physical education, I suggest that we formulate a definite statement of the abilities which would be considered essential for modern life. Several methods for developing that statement suggest themselves. College students might be asked to state what skills, appreciations, and what knowledge they would consider essential. Women who have been out of college for several years might be asked to make a similar statement. In presenting the problem to a number of women who are not in the profession the following replies were made: "Every woman should know two or more recreational skills"; "I'd like to know how to swim"; "Every woman should have good carriage"; "Every college graduate should have the knowledge which would enable her to control her weight"; "The cooperation developed through participation in team games is an essential experience for every woman". A third method of formulating objectives would be the agreement of a group of experts in the field.

A few years ago, this organization published a statement of the essentials for a department of physical education which included among others the number of instructors on the staff, time requirements for the work, the numbers of students in a class, the amount of

recreational and exercise space. The agreement that certain standards were necessary must have been based upon certain objectives. A swimming pool was included as a necessary part of the equipment because every college student should learn to swim. There should be not more than thirty women in a hockey class because the necessary skills could not be taught in the alloted time to a larger number. It was hoped that the selling of definite standards in terms of number of teachers, amount of space, would help each of us to develop a favorable working situation, both in developing our individual ideals and in convincing our presidents that we had needs. Would it not be advisable for this group to agree upon the abilities which women should have before the college degree should be guaranteed?

A possible statement of abilities is indicated by the following: All abilities shall be classified in five groups: (1) Skills of daily life, (2) swimming, (3) team games, (4) leisure time activities, (5) rhythmic activities. Under each group would be listed specifically the accepted skills.

(1) Skills of daily life:
   a. the ability to assume a good standing posture
   b. the ability to recognize defective posture
   c. the ability to climb a rope to a height of ten feet above reaching height

(2) Swimming:
   a. ability to swim for 20 minutes
   b. ability to bob 10 times in water at least 8 feet deep

(3) Team games shall include hockey, basketball, baseball, volleyball.
   A student shall have the ability to referee any two of these. She shall meet the skill qualifications stated for at least two of the games. Example: Hockey—ability to dribble a ball 50 yards in twice the time the distance could be covered in running without the dribble.

(4) Leisure time activities shall include archery, tennis, golf, riding.
   A student shall meet the skill requirements for at least two of these activities.

(5) Rhythmic activities
   a. ability to demonstrate the polka and waltz steps

Compare the effect on the student of a statement of specific abilities with a requirement stated in terms of two hours per week. The first permits self rating; the student, knowing that she can qualify in tennis, posture, and swimming, will find it necessary to choose activities to develop the skills which she needs. Selection of activities will be made because the student recognizes the lack of certain abilities in herself.

Courses within the department will then need a definite statement of objectives—since a student will be entering a course to secure definite earnings. This will result not only in greater interest because the student has a definite problem, but it will result in greater interest

because the student need not enroll in a course if she has the skills which are to be taught. In too many institutions, at the present time, a student may enroll in a course any number of times. She may have played basketball for four years in high school, but in enrolling in the average college course she finds herself with students who have never played and with students who may have had four years of experience in high schools as well as one, two, or three years in college work. The work is repetition for some students and a high degree of attention and interest cannot be expected.

For the student who has attained all abilities which are considered essential, there need be no required instruction; no required additional skills. That student should look upon the physical education equipment as a woman's athletic club. She would come three or four times a week for recreation and exercise. If she wished to play tennis at ten on Monday and to swim at two Tuesday, she should be permitted to do so insofar as equipment would allow. As work in the high schools develops, this plan will tend to reduce the size of the teaching staff in colleges and universities and the resulting saving can be utilized in providing additional recreational facilities.

Grading need no longer be the results of the instructor's judgment. If objectives are specifically stated, we are already on the way to finding a means of measuring. Consider the difference between an aim which is to develop habits of good posture and one which is to develop the ability to assume a good standing posture. How can the physical education instructor measure posture habits? With the aid of a silhouetteograph and a posture scale, the ability to assume good posture can be measured fairly accurately. Grading will have meaning for the student. She will know that considering certain abilities she stands in a certain position in relation to the remainder of the group.

Not only will the statement of definite objectives be a means of stimulating student interest, but it will be an aid in answering many of the questions which we are asking ourselves.

How can we determine what are the better teaching procedures until we know exactly what we wish to accomplish? Can the ability to assume a good standing position be most efficiently taught through gymnastics or through dancing? Only experiment can tell—but how can we measure the results of teaching except in measuring the results? We have discussed at various times methods of grading and methods of measuring improvement—any method of grading and measuring must include a statement of what is to be graded and measured.

With the statement of specific abilities, will we lose the social and personal qualities which we claim are a result of participation in physical education activities? There is no foundation for such fear. Ob-

jectives are specific and tangible or general and intangible. A student may develop perseverance in developing the ability to dribble a ball at a certain speed, just as much as in playing a game of hockey. Formulating a definite statement of skills wherever possible does not eliminate concomitant learnings; the attitude toward a given situation cannot be eliminated. This plan does not suggest that any desirable objective be discarded; but rather that teaching will improve to the degree that objectives can be so stated that results can be measured instead of estimated.

Among the many problems facing the profession are lack of interest on the part of students and desire for development of good teaching methods. Both of these can be solved in part by building a curriculum which is based on the statement of specific abilities as objectives.

II. *Fundamentals of the College Physical Education Program*

Several years ago we began to question the claim of gymnastics to a place in the physical education curriculum. Back of that questioning was the agreement that physical education must do more than train and strengthen muscles; it must prepare for living. It was agreed that each individual must be considered as a human entity who could best learn to live with his fellows by living in situations which demanded cooperation, that the standards for this cooperation must be set by desirable leadership. Fifteen minutes of basketball, we said, is superior to fifteen minutes of floor work; the organic stimulation is as great; there is action depending upon action of others and there is opportunity to develop desirable social and moral qualities provided the leadership of the group is of the right type . . . Some said the movements in gymnastics have been artificial; they are like nothing used in life; we must have a system of gymnastics in which movements are related to actions of daily living. To this group "Natural Gymnastics" and "Danish Gymnastics" appeared a possible solution.

Each physical educator must face these questions: "Shall there be certain required courses or shall the program offer a number of activities from which the student may make her own choice?" "If certain courses are required, what shall be the course content?" Present practice shows that the profession has answered these questions in every possible way. Certain institutions have programs which consist of one or two activities which are required of all students; others offer a variety of activities from which the student may choose as she will; a third group has one or more required activities and in addition a number from which the student may choose. In the last group the required courses are, in the majority of cases, gymnastics; swimming is next in frequency; and, in at least one institution, the

required activity is hockey. (Johnson: Organization of the Required Physical Education for Women in State Universities—1927).

In my own thinking on the question, requirements have divided into two classes: first, specific skills which will contribute to the well being of any woman, and second, general habits of response which I call fundamentals of physical education. In the first group shall be included the ability to participate with average skill in one or more of the recreational activities common to life of today—swimming, tennis, golf, riding, archery. Under this grouping would also be included the ability to assume the type of body posture which the individual might consider desirable. Some would include it in specific abilities relating to team games and rhythmic skills.

In the second grouping, that of general habits or fundamentals of physical education, I would include—(1) The development of kinesthetic perception to such degree that each individual will consciously use it. Griffith in "Psychology and Athletics" (p. 17) says, "We must learn to think of our muscles and bones and bodily organs as being outside of the nervous system just as the chair upon which we sit or the trophy which we are looking at is outside of us." Many individuals have learned to adjust through kinesthetic perception—they have the ability in anticipation or in memory to feel the body in action. Recently in observing a class in tennis, I saw one student, after criticism from the instructor, swing her racquet again and again and on her face was the expression of one listening carefully: consciousness of the net, the ball, the game was eliminated as she concentrated on the kinesthetic picture of the swing. The world about us has forced development of abilities to adjust to information given through sight, hearing, and touch. Should it not be the function of physical education to stimulate development of the ability to adjust to information given by muscles and bones?

Effort to develop the feel of body movement plays a large part in the teaching of dancing, especially in the work of Margaret H' Doubler and her students. What is the purpose of working in the prone position but a method of giving clear kinesthetic pictures? In natural gymnastics—the practice of sport techniques—there is opportunity for development of body perception. But there must be conscious attention to the information which muscles and tendons give, or as little will be learned as when we look but do not see or listen but do not hear.

Griffith has indicated possible methods and values of training the kinesthetic sense in his description of the blindfolded men who learned to throw basket balls and to swing golf clubs with accuracy. Man will be more thoroughly master of himself when he draws his bow string by the feel of his arm rather than by the corner of his mouth.

(2) A second fundamental is the ability to observe and to visualize in terms of time elements, or rhythm. By rhythm I mean division of time—the division may be made by sounds, changes in movement, by changes in pressure, by any stimulus which reaches consciousness to mark beginning or end. Repetition and accent may or may not be present. In the light of this meaning, every movement of the body has rhythm. We recognize it in skills when we speak of the "swing of the thing." So often a skill is learned by attempting it in parts and then thru repetition searching for the swing or the rhythm. Would it be possible to develop the ability to observe and feel a rhythm, that "the swing" could be visualized before the first practice? We would then start with "the feel" of a skill, instead of fumbling for it. We could learn, in what we are told is the most efficient method, by the "whole rather than by parts."

Miss H'Doubler has developed this principle, too, in teaching of rhythmic skills. Students beat a rhythm before they attempt body execution. Rhythms heard are reproduced by foot action; rhythms are beat upon the feet and sensed through touch and repeated by foot action. In the beginning the patterns reproduced will be simple. With training, "complex, compound, and complex-compound" patterns can be sensed and repeated.

The value of this ability to sense the rhythm of a skill is evident. No department of physical education can hope to teach all skills which its students may wish to use; any year may see the introduction of a new game, of a machine requiring new combinations of movements. If the individual has acquired the ability to look at skills as a whole, to sense the rhythm of them, she will not face the need of an instructor to dissect the skill before she can imitate.

(3) A third fundamental would include the acquisition of and ability to use knowledge of the laws of physics as applied to body skills. In development of the course content for such knowledge, we should list activities which are part of daily life; such as lifting, catching, throwing, striking. (Note—This list is not complete; it is intended to serve as illustrative material). Under each would be listed the guides which would tend toward efficiency. As an aid in lifting, the student would learn to use a right angle pull and to lift with the muscles of the thigh; in catching, she would learn the value of "give"; in throwing and striking, methods of obtaining force and of giving direction to an object thrown or struck through the air. Ability to apply these laws could come only through varied experience, through placing the individual in situations of lifting, of catching, throwing and striking which she had not met before.

The development of these general habits of response is fundamental since they are a part of all skills. They will make our work, what we claim it to be, "an education not a training."

Tests and Measurements in the Re-Direction of Physical Education

By Carl G. Chamberlain
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"ORDERLY, voluntary progress toward any remote goal depends on measurements. This being true, it should follow that the more complete and accurate the program of measurement, the more rapid and sure will be the progress, when measurements are used to determine or modify procedures."

If we agree that the objectives of physical education are (1) present and future health and (2) social efficiency; and if we further agree that physical educators should employ scientific procedures, similar to those employed in mental education, then two lines of procedures are indicated at this point—(1) A testing device must be employed which will assist in the classification of pupils according to individual needs and (2) tests must also be employed to check progress toward objectives and to modify procedures. It must be understood that should the tests show deficiency in our programs as developed, we must be ready to discard, rearrange or introduce new factors, regardless of personal desires, tastes or prejudices; and with an unselfish attitude for the ultimate benefits which our boys and girls are to derive from the work which we offer them, remembering always that our activities are a means to an end and never an end in themselves.

With this as a background, shall we turn next to the devices on which we should base our procedure?

Two types of tests are necessary—one, a device for the segregation of pupils into homogeneous groups for physical and health work in order to meet individual needs—and the other, tests to show progress, or lack of progress, both in order that we may be sure that the pupil is achieving results and that we may modify our programs whenever necessary in order to achieve greater results.

Most skill tests, per se, are of little value, unless they be used as measures of progress—and even then they must be so refined that they denote either qualitative or quantitative progress. It is one thing to be able to high jump six feet, and an entirely different thing to be able to demonstrate the "western roll" over a bar three feet high—yet both are skill tests. We need, then, to develop first, our objectives; second, a program designed to meet these objectives; and third, suitable testing devices to classify pupils into homogeneous groups,

to measure progress, to check the worth of our procedures, and to furnish the basis for modification wherever necessary.

For the past 18 months we have been conducting an experimental health education program along these lines at Charlotte High School, Rochester, N.Y. In the beginning our work was confined to boys, but now it includes both boys and girls. We are not yet ready to say that we have an ideal program, but we do feel that we are on the right track and are proceeding along sound educational lines.

The entire plan which we are using is based on the ideas and ideals of Dr. Frederick Rand Rogers, N.Y. State Director of Health and Physical Eduction and is admirably stated and described in his treatise "Tests and Measurement Programs in the Re-direction of Physical Education."

In 1924-25 at Columbia University, Dr. Rogers conducted exhaustive research in an effort to evolve a test of general athletic ability and condition that would meet the requirements of a sound educational test as to reliability, validity, objectivity, and economy. The result is the "Strength Index" and the "Physical Fitness Index."

Using as a basis a combination of tests to include such fundamentals as walking, running, jumping, climbing, etc., an effort was made to provide an economical, easily administered battery of tests that would give a rough index of general physical condition and have a satisfactory coefficient of correlation with the athletic tests. The result was the Strength Index, which is a combination of Ht., Wt., Lung Capacity, Grips (forearm), Pushups and Pullups (upper arms, shoulder-girdle), Back Lift, and Leg lift. These tests when properly computed give the S. I., which shows an "r" with general athletic ability of .81—which, when allowance is made for inaccuracies in experimental and statistical techniques, would probably show a true "r" of nearly .90.

With the S. I. determined, Norm. tables for age and wt. were prepared, and when the relation between an achieved S. I. and the norm is computed the result is the P. F. I.

Accepting the Strength Index and P. F. I. at full face value as a measure for the classification of pupils in physical education, the reorganization of our program was begun.

Inasmuch as the tests for boys were most complete and well-established statistically, we started our re-directed program with boys alone. Further, as the two programs proceed along identical lines, I shall describe briefly the boys' arrangements and results, and then go into detail on the girls' tests, in which you are doubtless most interested. Please bear in mind that the organization methods for both boys and girls are identical, the difference lying in the testing devices, and the subject matter.

May I, then, briefly trace our procedure? Every boy was given the physical capacity test, and his Strength Index as well as his Physical Fitness Index were computed. Assignments for health education work were made for the term.

Those boys whose P. F. I. was 15 per cent or more above the school average were excused from the usual gymnasium assignments and allowed to elect after school recreation in lieu of the usual work. A meeting of all boys who fell in this A group was held, and each boy filled out a blank on which he indicated his choice of after-school activities for the balance of the term. Those blanks were then sorted and tabulated and the after-school program was based on the demands as shown on the questionnaires.

Those boys whose P. F. I. was between the school average and 15 per cent above were rated as the B group, and assigned to the gymnasium in a separate class meeting twice weekly. In this group an effort was made to follow in a small way at least some of the ideas expounded by Wood and Cassidy in their book "The New Physical Education."

Those boys whose ratings were between the school average and 15 per cent below were assigned to the C group in a class by themselves where they have three periods of health education per week. A similar program to that given the B group was outlined, with the addition of considerable work on nutrition and posture. An effort to interest these boys in after-school activities was made, as one of the objectives of our experimental program is to attain 100 per cent participation in after-school recreation.

Those boys who were more than 15 per cent below the school average were assigned to the D group which meets every day for special work. In this group lies the big opportunity! Each boy was re-tested in order to check on the reliability of his physical fitness index; footprints were taken on the pedagraph to check on flat feet; posture silhouettes were made; height and weight were checked; and through the cooperation of the city health officer and the school physicians, each boy in the D group was given a thorough, stripped physical examination.

Before the physical examinations were given, each boy's parents were consulted and their written permission obtained for the examination. In every instance except one, the permission was readily given and cooperation with the parent has been most encouraging. Those boys who showed physical defects were given individual attention in an effort to correct the defects. When necessary, arrangements were made at the local hospitals to treat the boys in the various clinics, but usually a conference with the parents resulted in attention on the part of the family physician.

With the defects placed under treatment and remedied when

possible, boys who were underweight were placed on a nutrition program and a chart kept of their progress. For the overweight, obese diets were prescribed and a chart also kept.

Perhaps a typical case would be of interest. John Doe, 14 years old, 9 lbs. underweight, has a P. F. I. of 67 per cent. A conference with the boy revealed the fact that he had been suffering from ear ache for the past year. His father had died as a result of pernicious anemia and his family circumstances were none too good financially. A chat with his mother enlisted her cooperation and her consent to the physical examination was readily obtained. Drs. Smith and Jamieson made the examination and discovered a rapid heart rate, fatigue posture, and poor nutrition. Another conference with the mother followed. Dr. Carter, the school physician, made a re-examination to check up on the cardiac condition and recommended a visit to the ear, nose and throat clinic. Another conference with the mother resulted in the boy's being taken to the family physician for another check up. In the meantime, he had been put on a nutrition program in the school and a weight chart was started. The health teacher communicated the findings of the other physicians to the family physician with the result that the family physician influenced the mother to allow her boy to be taken to the hospital to receive the necessary attention at the ear, nose and throat clinic. A condition of pharyngitis was diagnosed. This has been cleared up and the boy has gained six pounds at this writing.

From this experience with the boys' program we have made some valuable observations and we have been continually on the alert to modify our procedures in every way in order to produce results that can be measured. To this end we have introduced testing devices in the "D" group especially. To check progress in the correction of foot defects we use the Pedagraph, a device that registers the foot print on paper with great rapidity and little effort. By comparing foot prints "before and after" the pupil can actually see his progress or lack of progress.

For posture work we use what we term a "silhouetteograph"—a home made device in its entirety. This is simply a bank of lights covered by a screen of architect's linen. The pupil stands in front of this light bank and we take a photograph with an ordinary camera. When the film is developed and printed the silhouettes of the subjects are used as a checking device.

The nutrition work is, of course, checked on a graph, and the apparatus used is merely a scale and a stadiometer. The Emerson nutrition program is used in the Rochester schools.

The Strength Index is used as a final check on general progress —the battery can be used either in whole or in part for this purpose.

Perhaps some of the results of the program in its first year of

operation would be of interest. We have a six year school for grades 7-12 inclusive.

A tabulation of comparative P. F. I.'s for January and June, by groups, might be of interest.

Group	Jan. Av. P.F.I.	June Av. P.F.I.
7B	89.95	100.
7A	100.	105.
8B	97.5	103.
8A	80.	96.
Entire Jr. High	93.7	101.7
9B	86.	106.
9A	86.7	102.
A	119.	130.
B	98.4	104.3
C	89.2	100.
D	71.5	87.
Entire Sr. High	93.3	102.7
Entire school	93.5	102.

Due, we hope, to the emphasis that was placed on nutrition, the school percentage of malnutrition decreased from 21 per cent in January to 13 per cent in June.

Because of the recognition given to after-school recreation as an integral part of the program, and because of an effort to interest every boy in some form of physical activity, 98 per cent of our available boys participated in at least one sport. This does not, of course, include those who are excused because of cardiac defects, hernia, etc.

I give this brief data on the results and procedures with the boys' group simply to point out the possibilities that result from adoption of the Rogers plan.

And now to the girls!

A strength test for girls has been devised that is comparable to that for boys. It includes these tests in the battery: Age, Height, Weight, Lung Capacity, Right grip, Left grip, Back lift, Leg lift, Pushups and Pullups.

Lung capacity is taken in cubic inches with a wet spirometer; the grip tests are taken in pounds with a hand dynamometer, the best of two tests being taken for record, testing right and left hands alternately; back and leg lifts are taken in pounds on the standard back and leg dynamometer. The score in one trial was counted for record, and re-test given only for cause. Arm and shoulder girdle tests are taken from pushups and pullups. The pushups are given on a regulation stall-bar stool placed on a mat to prevent slipping. The subject assumes a front leaning support position with feet on mat and hands gripping outside edges of stool, arms at right angles to body. The subject lowers her body from starting position to a

position with chest touching edge of stool and back to starting position, repeating as many times as possible.

The pullups are taken from a lean-hang position, hanging from regulation rings four feet from the floor. The starting position is a "back-leaning hang" with heels on mat; and arms at right angles to body. The test is to keep body straight and pull up until the chin is level with the bottom of the rings; then return to starting position and repeat as many times as possible.

The strength index is derived from the data secured by adding together lung capacity, right grip score, left grip score, back lift, leg lift, and the weighted arm score for pushups and pullups.

The arm score is computed by adding pushups and pullups, and multiplying the result by the product of the formula $\frac{wt}{10}$ +Ht.-60. For example: A girl executes 10 pushups and 10 pullups—she is 65 inches tall and weighs 100 pounds. Adding the pushups and pullups the product is 20. Computing the multiplier from the formula we have 10+5=15 (multiplier); then multiplying 20 by 15 we get a weighted arm score of 300, which is added to the other scores to arrive at the strength index.

Norm tables have been prepared to show average strength indexes for age and weight.

On the thesis that an expression of the relation of a girl's actual strength index to the norm for her age and weight will be an indication of her physical condition, the P.F.I. is computed by the formula:

$$\frac{\text{S. I.}}{\text{Norm}} = \text{P.F.I.}$$

Thus, if a girl achieves a Strength Index of 1000, and the norm for her age and weight be 1000, she would have a P.F.I. of 1.00—For convenience we move the decimal point two places to the right and express the P.F.I. as 100. If her S. I. is 1000 and her norm 1500, her P.F.I. would be $\frac{1000}{1500}$ or .67.

With the P.F.I.'s calculated for all pupils the girls are grouped for physical education according to the same plan as that of the boys, and results and progress checked in the same manner, the difference lying in the subject matter presented to the sexes.

Our work at present includes considerable experimentation in the girls' tests in order to establish validity, reliability and objectivity. Economy has already been well-established in that pupils can be tested at the rate of one a minute with each pupil in the testing room for about ten or twelve minutes. It is important for purposes of comparison that all tests be given in the same order—i.e. age, ht., wt., lung capacity, right grip, left grip, back lift, leg lift, pushups and pullups.

In this order the building up of the fatigue factor is constant in all tests wherever and whenever given. It is also advisable to permit a five minute rest between pushups and pullups when the girl does more than one pushup.

Considerable care is necessary in administering the back lift, leg lift, pushups and pullups. With a little practice, proper technique can be mastered and valid measures made.

The correlation of the girls' strength index with athletic ability is now under way—we trust that we shall be able to publish the results very soon.

Experiments are also under way to establish reliability and validity.

We feel that Dr. Rogers' tests are to physical education what the I.Q. is to mental education, and we are eagerly looking forward to the time when all physical education is on a sound basis of testing progress and measuring results.

The studies thus far have brought to us a new insight into the possibilities of physical education. In closing may I repeat that—

"Orderly voluntary progress toward any remote goal depends on measurements."

Responsibility of Major Departments of Physical Education for Training in Health Education Teaching

By Alice Evans
Assistant Professor of Physical Education, University of Michigan

THE amount and type of training in health education necessary for majors in physical education depends first on the demand likely to fall upon them for carrying the health education program either in a teaching or supervising capacity and second on the amount of health training they need to round out and complete their concept and use of the physical education program.

There has been much controversy as to whose province it is to carry the health program. Professor Hetherington claims that the only teacher really qualified for that service is the physical education teacher because, he thinks, the successful health program can only be motivated and carried through the activity drive which is the most potent and dominant interest of children. The desire to condition oneself for capacity to *do* in athletics and sports, he finds the greatest stimulus to health practices.

On the other side, we find those especially trained for health education who claim that the field of health education is larger and more comprehensive than physical education, that it covers more hours of the day than the physical education teacher can adequately reach, that it covers more avenues of approach to the child than just the physical activity side. On this basis they feel that the person to carry the health program is the specially trained health teacher.

What is the actual situation we find in the field? Many schools, elementary as well as high schools, are opening up the position of health counselor who has charge of the whole health program in the school. We find also special health teachers carrying much of the class room health teaching; the school nurse is doing her share of the educational as well as practical side; the economics teacher is often a great force in nutrition teaching which is such a big part of the program; the grade room teacher may be the best and most successful medium for carrying and motivating the program for the young child.

In the face of this, how much demand for health education is likely to be put upon the physical education teacher? We know that there are now and are likely to be many instances in the school program where she has the entire responsibility thrust upon her, where

in addition to the physical activities she must carry the health teaching, the correlating of the school program along health lines and the stimulating of health interests throughout the teaching staff. There are many instances where the physical education teacher must also supervise the health program to a considerable extent.

In addition to the actual responsibilities for health teaching that may fall upon the physical education teacher, there is no doubt that her physical activity teaching will be greatly benefited by a broad and comprehensive study of health education.

The real problem is to know how much training in health education must be added to the already over full physical education program, just how much responsibility for the health teaching we must prepare for; what additions and emphasis are necessary.

The first and perhaps the most essential thing is to *sell* the health idea to every student in such a way that she becomes a dynamic force for a future health program. Selling the idea indicates the formation and establishment of favorable attitudes. These favorable attitudes are formed only by *doing* in a desirable way under desirable conditions. Favorable attitudes are the foundation of inspirational teaching which is the only kind that really carries over in health teaching. The health teacher needs to acquire these through her own experience in order to be adequate in influencing others. So *selling* the idea is of vast importance.

What can physical education departments do by way of selling the health idea?

Departments must offer environment and opportunities for a worth while, wholesome living health program that gives the student a chance to try out and evaluate health practices. She needs the chance to prove to herself that these practices are worth while. This must include right living facilities, social relationship, recreation and all factors concerned with daily health practices. It may be hard to supply this opportunity in institutions where the physical education department has little control over the living conditions, but it is essential if we want to give the practical and living aspect of health, if we want a "health policy" rather than a "health course." We find many institutions trying this approach to the development of a real health consciousness. The results at Ellensburg Normal in Washington and other places make us rather confident that this method can succeed.

Probably most physical education departments are giving adequate attention to medical examinations and follow-up; most of us are using the actual examination as a teaching opportunity to make the student realize the significance and value of this as a preventive measure. Yearly repetition of this experience helps to form attitudes toward health that are important.

To contribute to a well rounded concept of a health program the student load must be carefully considered and arranged. The student curriculum must allow a budgeting of time that will give opportunity for adequate sleep and rest, for leisure and for social interests. The student must have time to have her own personal as well as professional development. On this point many physical education departments are at serious fault in over-crowding the professional program.

The specific teacher training work in health education should be so planned that it gives a unified and balanced concept of health. Specific training should also be based on the child's needs and interests in order to be a real learning process for the child. For this, adequate teaching in educational principles, based on psychology and philosophy, should be thoroughly covered so that practical methods may be used in applying the program. The major students need acquaintance with the genetics of the physical, mental, emotional and social development of the child, understanding of interests and drives at different ages and the tendencies of mental reactions. These factors are fundamentally necessary to a real understanding of what the health program should be and the way it should be applied.

Since the health program needs to be so dynamic and so much a part of practical living much of this fundamental knowledge should be acquired through the case study method. The courses in educational psychology and child growth have often offered too much intangible unrelated class room study material which the student teacher seldom seems able to apply to specific situations or to use in actual contact with children. This phase of training should be made as thoroughly practical as possible for both health and physical education preparation. Perhaps there is no point in this group of training which should not be equally emphasized for both.

The scientific background needed for physical education and health education is almost identical. Both need thorough training in physiology and chemistry. The health education side needs more emphasis perhaps on bacteriology because of the need of practical use of it in teaching problems of communicable disease; it needs greater acquaintance with the problems of sanitation and community service along this line; and it needs a more extensive study of nutrition which plays so big a part in the health program. The nutrition courses should prepare the student teacher to teach the fundamental principles of nutrition as well as the practical side of dietetics and should make her capable of discussing nutrition in a safe and sane way with children in personal conference. It seems inadvisable, however, to have her expect to do any diagnostic, nutritional work.

It is, perhaps, more the concern of health education than physical education just what place the health service holds in the school. The

health education student needs to become familiar with all the problems of the health service such as: examinations; the possibilities of follow-up through the school and the home; the relation of the school room teacher to the examination and health condition of the child. She needs to become familiar with specific methods of control of communicable disease and with the activities of the nurse and physician in the school. It is important for her to know the facilities in the community for effective follow-up. Also she needs considerable information on the relation of the school health program to the city, county and state boards of health.

The problem of effective taking and keeping of all health records is a necessary study. Not only should she become familiar with methods of record taking, but she should be given suggestions on how to use the records for statistical purposes, for motivation in selling the health program and for the improvement of the health conditions themselves.

School administrative methods should be made familiar so that she may know how to dovetail her health work into the whole administrative scheme. We all know that it is only with the backing and active support of the administration that the health work can really *go,* so it is quite essential that the health work be an integrated part of the school system.

On the side of actual teaching of health, there is a vast field with which the teacher should become conversant. In addition to the fundamental training in sciences and education, she should become familiar with the different treatment of the same type of material at the different age levels. She needs to know which habits to teach at different ages, how much and what type of emphasis to put on each. Her understanding of progression in handling the material is essential where the same health habit is attacked again and again at the different age levels. The repetition must be dynamic, interesting, and of a type that stimulates carry-on. For instance, the approach for first grade is of a habit repetition type that allows for success and associates pleasure, while the approach for junior high school should contain the possibility of interest in scientific knowledge about the habit as well as the chance to do it in a broad and interesting way. The broadening and changing interests as the child grows older are important considerations in applying the health program.

Motivations and devices for catching, holding and stimulating interests at all ages need to be considered as important tools for getting results. The teacher should become familiar with this rich field of material in order to be adequately effective. Also she should correlate her work with the rest of the school by using devices common to other school work thus making the health work fit in with

other projects or activities that are being carried out in the schools.

Acquaintance with references, text books and visual material of all sorts is of importance in knowing the field and these should be kept up to date.

All methods used in the conduct of health teaching should be based on child study and should fit into life situations. This necessitates intelligence, resourcefulness and flexibility of adjustment on the part of the teacher. The personality, enthusiasm and attitude of the teacher perhaps are leaven in the use of any method.

In addition to the usual direct class room methods of teaching, there are a number of other methods with which teachers have produced marked success. A valuable one is the "incidental method," which is actual teaching done on any health point as it arises in the daily life of the children. This is always informal teaching with discussion by the group and teacher and is not given in any special health period, but treated as it comes up in class time. It takes the health practice in the life situation and is frequently able to bring out cause and effect relationship in a pointed way. This method should be used especially for younger children, but is valuable at all age levels and should continually supplement any other form of teaching that is being done. It can be our most dynamic form of health teaching if opportunely used.

The "systematic incidental" method also can be used most successfully. This is like the other in that it uses incidents as they arise, but the teaching on that incident is done in a regular health teaching period. The teacher has previously laid out a year's program based on objectives, but instead of giving lessons in a regulated order, she takes points as they arise in the daily life situation and teaches on them. It sometimes may take a little manoeuvering to avoid repetition and to include all the program planned for, but where it has been tried it has proved a successful method of supplementing the outlined set course of study.

The use of projects in health teaching is very important. There are myriads of them that are of real interest especially for group work. The health teacher should know how to direct the reference work, to organize the compilation of material and unification of results, how to survey and analyze the information needed, and how to correlate the group and individual contributions for group presentation and use.

The problem method of study and report is also a form that must be understood and used.

The teacher should be able to conduct a comprehensive survey as a preliminary procedure to any health program, also to direct student surveys as part of the class room teaching and club organization work.

All these methods need to be understood by the student teacher.

She needs also to know about how much she can expect to attain in the way of acquisition of health habits, attitudes and knowledge at the different ages. On the basis of these objectives, lesson plans and teaching units for health classes should be carefully worked out for different age levels and specific groups. If possible, she should be given the opportunity of actually teaching these lessons under supervision to real children. Directed teaching in health is as important as in any other subject.

One of the most important considerations in a successful health program is that of correlating health teaching with other work that is being taught in the schools. This necessitates considerable general knowledge of the whole school curriculum before the teacher can be awake to the possibilities of its use.

Methods of health testing and evaluating results are another important part of her educational program. She should also know the methods of establishing relations with the forces in the community concerned with health. Methods by which the parent may be brought into contact and encouraged to cooperate with the health program must be considered. Selling the health concept to parents is sometimes our most difficult task but a most essential one if we want to get results.

The problem of training for supervision is a large one. It includes, of course, all the above preparation with some additional. The supervisor must have training and experience that will enable her to help the teacher in the field. She will be called upon to outline work, suggest methods, supply material and stimulate for dynamic results. The supervisor needs especially to see the health program as a whole, all phases of it for all ages and to recognize all factors in the school program that can be used to correlate and tie together the administration and teaching elements so that they contribute to each other as a working unit.

This sounds like a comprehensive program. It cannot be otherwise for such an important field. If our major training course in Physical Education is adequate and thorough in scientific and educational background probably much of the needed training for health teaching could be given in one or two additional comprehensive courses which deal with health education content and methods. Perhaps the emphasis in science courses now offered can be changed so that practical health values are made more usable. The courses in methods and education can certainly be made to give a better understanding of the school program and so open up possibilities of its use in health teaching. On the whole, the desired training we have been discussing can be brought about by a readjustment of what is now being given with a small addition rather than by the addition of a great deal of new subject matter and time.

Recent Investigations of the Menstrual Problem

By Norman F. Miller, B.S., M.D.
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THE scope of the menstrual problem is considerable, since it has an economic (6,8) as well as a health aspect, including as it does irregularities in time and amount of the flow, as well as menstrual pain and discomfort. Since consideration of this problem in all its ramifications includes more than can be taken up in the scope of this paper, we shall confine our remarks to its more important phase, namely pain or dysmenorrhea.

The menstrual problem is not new. From earliest antiquity medical men have had to face the problem of relieving this periodic discomfort. More than two thousand years ago Hippocrates recommended the use of bougies to dilate the neck of the uterus in case of dysmenorrhea. For hundreds of years the subject has defied complete understanding and today even with our greatly improved methods of study we know little more concerning dysmenorrhea than was known generations ago. That this problem remains today one of the more important, incompletely answered, scientific riddles, is evidenced by the fact that Jacobi in 1877, found 46 per cent of young women suffering from dysmenorrhea, while in 1927, fifty years later, we find practically the same percentage of young women similarly afflicted. The important work of Hitschmann and Adler (3) of more recent years has given us an insight into the histological changes taking place in the uterus at the time of the normal menstrual period. Many of the more important physiological alterations, however, are still imperfectly understood. With the histological changes of the menstrual period well established, investigations into this problem now have the advantage of being based on sound and fundamental principles.

Known Causes of Dysmenorrhea: Undoubtedly many conditions play a part in causing dysmenorrhea. The custom of classifying these factors into groups tends to complicate rather than facilitate its study. With increasing knowledge regarding the condition, it becomes evident that menstrual pain is invariably secondary to some derangement of the general bodily mechanism. It matters little whether the cause be developmental or acquired, intrinsic or extrinsic, its dependent character remains the same. Among local pelvic lesions,

Holden (4) believes that retrodisplacements of the uterus, pelvic inflammatory disease, and tumors of the uterus, particularly myomata, are the principal offenders. Physicians have long been aware of the relationship existing between the small, underdeveloped, and often acutely anteflexed, type of uterus and dysmenorrhea. This relationship has been noted too frequently to be viewed as merely coincidental. More recently, disturbances of the glands of internal secretion have come in for their share in the responsibility. Likewise, disturbances in the normal physiological process of menstruation sufficient to cause clotting of the menstrual blood, or overgrowth of the lining mucous membrane, must be considered among the known causes of menstrual pain. Early teachings and family traditions, environment, occupation, fatigue, and temperament, are all important factors in determining the severity of the symptom.

The vast majority of young women suffering from dysmenorrhea reveal no definite lesion to account for it, and it is with this large group of unexplained cases that we are primarily concerned. Our interest has been roused more than once by the reports of teachers of physical education concerning the benefits derived from regular exercise, and indeed, we must admit the leadership of physical education in bringing about a definite reduction in its general incidence.

Purpose and Scope of This Study: Stimulated by reports of earlier investigators in this field (2, 9), we became interested in determining, if possible, the basis for this improvement, and to what extent the principles of physical education and body mechanics enter into the production of other common gynecological conditions. While this report will deal only with dysmenorrhea, the study includes backache, leucorrhea, menorrhagia, metrorrhagia, constipation, pain in the sides, amenorrhea and displacements of the uterus. Our findings as to the relationship existing between other common gynecological conditions and faulty body mechanics will form the basis for subsequent reports.

Material Utilized: The material used consists of data obtained from about 900 young college women and nurses. As will be seen from a study of Table I, this group represents a fair cross section of the young women of this country.

I wish at this time to express my appreciation to Miss Josephine Rathbone of Wellesley College, Miss Elizabeth Halsey of the University of Iowa, Dr. Margaret Bell of the University of Michigan, and Miss Lois Corder, Superintendent of Nurses at the University of Iowa, for their willing cooperation in making this study possible.

Method of Study: Since the methods utilized are familiar to most teachers of physical education they will only be mentioned as a matter of record. The work was commenced in the fall of 1927 at

TABLE I
Source of Material

Wellesley College	416
University of Iowa	308
University of Michigan	122*
University of Iowa Nurses	61
Total	907

which time each individual was given the usual entrance physical examination and classified qualitatively with reference to posture and muscle tone. A permanent record of the individual was obtained in the form of the usual silhouette or shadow picture. The depth of the lumbar curve (lumbar index) was also measured and in 364 cases the angle of pelvic inclination was determined by means of the cleisiometer, an instrument especially designed for this purpose. In addition, replies to the questionnaire shown in figure I were obtained by direct questioning. So far we have been able to carry out our original plan of obtaining an annual check-up. The first check-up examination was made in the spring of 1928 and the results, in part, are included in this report. The second check-up has just been completed, too late to permit incorporating the findings.

Objections to Methods of Study Utilized: As in most studies of this nature there are two outstanding criticisms, neither of which can easily be eliminated. The first is the almost complete reliance upon personal observation and interpretation for data obtained, there being no methods or instruments of precision which enable us to determine accurately the posture or muscle tone of an individual. The second criticism lies in the lack of complete physical examinations. Valid as these criticisms are, further consideration will show them to be less serious than one would at first suppose. In so far as posture is concerned this deficiency is of minor importance, since it is perfectly possible to develop sufficient diagnostic acumen to determine posture ratings satisfactorily. In most instances more than one experienced individual decided the posture ratings. With muscle tone determinations this lack of precision is more significant and as a result our findings in this respect are less satisfactory. The necessity for a complete review of this subject is obvious, and we hope in future work to devise a more satisfactory method of determining this factor. While each individual received the usual entrance physical examination, it is obvious that such an examination gives little information regarding the condition of the pelvic organs or the glands of internal secretion. Were pelvic examinations possible they would still be of little value unless made by one trained in this

* Since this group consisted almost entirely of selected dysmenorrhea cases it was not included in all tables prepared for this paper.

GYNECOLOGICAL RECORD

University of Iowa Department of Obstetrics and Gynecology

NAME (in full) .....(S.M.W.D.) CLASS.....DATE.....No. .....

AGE.....LUMBAR INDEX (in millimeters).....POSTURE A.B.C.D.E. MUSCLE TONE (excellent) (aver.) (below aver.) (poor) Weight..... Height..... AGE when flow began..... INTERVAL (regular) (irregular) Length of PERIOD.....days

DYSMENORRHEA (yes) (no) (crampy) (steady ache) (mild) (moderate) (severe) Pain begins (before) (with) (after) onset of flow Pain lets up (before) (with) or (....hours or ....days after) onset of flow In bed at menses (yes) (no) If yes (....hours) or (....days) Pain worse when tired (yes) (no) Worse when constipated (yes) (no) EXERCISE able to continue daily regime omitting exercise (yes) (no) Able to take moderate exercise (yes) (no) Able to take vigorous exercise (yes) (no)

CONSTITUTIONAL DYSMENORRHEA (state symptoms other than pain)

LEUCORRHEA (yes) (no) Constant (yes) (no) At periods only (yes) (no) Pads required (yes) (no) Worse when tired (yes) (no When constipated (yes) (no) Began ....years ago

MENORRHAGIA—flow more than six days (yes) (no) Normally flows....days No. of pads per period.... Worse or more frequent when tired (yes) (no) Worse when constipated (yes) (no)

METRORRHAGIA—inter-menstrual bleeding (yes) (no) Duration of such flow....days Began ..... years ago Worse or more frequent when tired (yes) (no) Worse when constipated (yes) (no)

AMENORRHEA—cessation of flow (yes) (no) (Frequent) (Occasional) Connected with change of residence (yes) (no) Flow decreased or ceased when tired or worried (yes) (no) Flow decreased or ceased when constipated (yes) (no)

BACKACHE (yes) (no) Where located (sacrum) (lower lumbar) (small of back) (referred down legs) (mild) (moderate) (severe) Constant (yes) (no) At period only (yes) (no) If constant it is worse at periods (yes) (no) Worse when tired (yes) (no) When constipated (yes) (no)

Name any BACK INJURIES or ORTHOPEDIC BACK LESIONS

PAIN IN SIDE (yes) (no) (Both sides) (Right) (Left) Constant (yes) (no) At periods (yes) (no) Worse when tired (yes) (no) Worse when constipated (yes) (no)

CONSTIPATION (yes) (no) Duration....years (Worse) or (Better) at periods.

FOLLOW-UP RECORD

Spring 1929 Date			Spring 1930 Date			Spring 1931 Date		
POSTURE { excellent..... good..... fair..... poor.....			POSTURE { excellent..... good..... fair..... poor.....			POSTURE { excellent..... good..... fair..... poor.....		
MUSCLE TONE { excellent..... good..... fair..... poor.....			MUSCLE TONE { excellent..... good..... fair..... poor			MUSCLE TONE { good..... excellent..... fair..... poor.....		
LUMBAR INDEX			LUMBAR INDEX			LUMBAR INDEX		
Symptom Present	Yes	No	Symptom Present	Yes	No	Symptom Present	Yes	No
Dysmenorrhea			Dysmenorrhea			Dysmenorrhea		
Leucorrhea			Leucorrhea			Leucorrhea		
Menorrhagia			Menorrhagia			Menorrhagia		
Metrorrhagia			Metrorrhagia			Metrorrhagia		
Amenorrhea			Amenorrhea			Amenorrhea		
Backache			Backache			Backache		
Pain in sides			Pain in sides			Pain in sides		
Constipation			Constipation			Constipation		
Remarks			Remarks			Remarks		

FIGURE I

work, and even then, the findings would be clouded by the difficulties normally encountered in examining young girls. Rectal examination of the pelvic organs, though a poor substitute, would, if made by an experienced examiner, rule out the more obvious pelvic lesions. For our purposes we have assumed that the majority of young girls have as normal pelvic organs as their general physical examination would seem to indicate. Advanced changes resulting from disturbances of the glands of internal secretion would probably have been noted on general inspection, but incipient changes can only be determined by careful study, including the use of special tests. Obviously, in the face of these criticisms, statistics obtained from a study of this nature can only be accepted in the broadest sense.

Results of the Present Study: The results, insofar as dysmenorrhea is concerned, are shown in part in Table II.

TABLE II

Results of Study to Date with Special Reference to Dysmenorrhea

INCIDENCE OF DYSMENORRHEA IN 1927 AND 1928

DYSMENORRHEA	PERCENT	
1927	47	
1928	21	

Analysis of Dysmenorrhea Cases: The most striking finding in the period covered is the 50 per cent reduction in the incidence of dysmenorrhea. In order to evaluate properly the significance of this reduction it is necessary to know what is included under the term *dysmenorrhea*. In our study the presence of dysmenorrhea was determined on the basis of three criteria; first, the individual's own statement as to the prosence of pain at the time of the menstrual period; second, the necessity for bed rest at this time; and third, the amount of exercise taken. The findings are shown in Table III.

TABLE III

Incidence of Dysmenorrhea as Determined by Three Criteria

Statement of individual	47 per cent
Required bed rest	17 per cent
Little or no exercise	17 per cent

While the frequency of dysmenorrhea based upon required bed rest, or limitation of activity, is considerably less than the incidence as based upon the statement of the individual alone, this difference can readily be explained on the basis of mild discomfort, insufficient to require bed rest or limitation of normal activity. If we are justified in including the milder types of dysmenorrhea in our statistics, then

it would seem that 46 per cent represents quite satisfactorily the usual state of affairs. Since it is not infrequent for some young women to welcome an occasional opportunity for bed rest, we may assume that the incidence based on this factor is slightly high. Likewise, one may reason that in this modern age there are some individuals who are reluctant to admit any menstrual handicap whatsoever, and as a result, take active exercise even though their natural inclination would be for rest. Detailed analyses of these groups are shown in tables IV and V.

TABLE IV

Incidence of Dysmenorrhea Based on Exercise Taken

NUMBER OF DYSMENORRHEA CASES TAKING EXERCISE

TYPE OF EXERCISE	NUMBER	PERCENT OF DYSMENORRHEA CASES	PERCENT OF TOTAL	
NO EXERCISE	30	7	4	17%
MILD	104	25	13	
MODERATE	229	53	29	
STRENOUS	61	14	8	
NOT STATED	5			
TOTAL	429			

TABLE V

Incidence of Dysmenorrhea Based on Required Bed Rest

NUMBER OF INDIVIDUALS REQUIRING BED REST IN A SERIES OF 429 CASES OF DYSMENORRHEA

DURATION OF BED REST	NUMBER	PERCENT OF DYSMENORRHEA CASES	PERCENT OF TOTAL
HOURS	83	19	10
DAYS	58	14	7
TOTAL	141	33	17

Analysis of the type of pain and its relation to the time of onset and to cessation of the flow is shown in Table VI.

The advisability of classifying dysmenorrhea into types according to whether it is a crampy or steady ache variety of pain is open to some question. In most individuals both types of pain may be noted, either at the same or different periods. From study of Table VII it will be seen that in 50 per cent the pain ceased during the first day and in 80 per cent the discomfort was gone before the end of the second day of the flow. We shall have occasion to refer to this finding again later.

TABLE VI

Relation of Type of Pain to Time of Onset and Cessation of the Menstrual Flow

RELATION OF TYPE OF PAIN TO TIME OF ONSET AND CESSATION IN 429 CASES OF DYSMENORRHEA

TYPE OF PAIN	NUMBER OF CASES	PAIN BEGINS ONSET OF FLOW						PAIN LETS UP ONSET OF FLOW					
		BEFORE		WITH		AFTER		BEFORE		WITH		AFTER	
		NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
CRAMPY	259	68	26	148	57	43	17	1	.4	8	3	250	97
STEADY ACHE	170	45	26	93	55	32	19	1	.6	5	3	164	97
COMBINED	429	113	26	241	56	75	18	2	.5	13	2	414	97

TABLE VII

Duration of Pain in Dysmenorrhea

DURATION OF PAIN IN DYSMENORRHEA

AS DETERMINED BY STUDY OF 1000 PAINFUL PERIODS

DAY PAIN LETS UP	NUMBER OF CASES	PERCENT
1ST DAY	500	50 } 80
2ND DAY	295	30 }
3RD DAY	135	13
4TH DAY	46	5
5TH DAY	18	2
6TH DAY	6	

Relation Between Posture and Dysmenorrhea: *In general it was noted that individuals with the better types of posture were less apt to have dysmenorrhea.* The evidence substantiating this is not great but is sufficiently consistent to permit the assumption of a definite relationship. When persistent dysmenorrhea occurs in individuals with good posture we may well question the existence of definite underlying disease. Details of our findings in this respect are shown in Tables VIII and IX.

Relation Between Muscle Tone and Dysmenorrhea: We are fully aware of the confusion which exists concerning muscle tone, but believe that the use of the term in the qualitative classification of individuals is justifiable. The normal physiological functions of the human organism are dependent upon the tone of its various constitu-

TABLE VIII

RELATION BETWEEN DYSMENORRHEA, POSTURE AND MUSCLE TONE AS NOTED AT THE TIME OF THE ORIGINAL EXAMINATION (1927) AND AGAIN AT THE TIME OF THE FIRST CHECK UP (1928).

1927	NUMBER OF CASES STUDIED	PERCENT WITH DYSMENORRHEA	POSTURE								MUSCLE TONE							
			EXCELLENT		GOOD		FAIR		POOR		EXCELLENT		GOOD		FAIR		POOR	
			NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
	785	47	36	5	181	23	391	50	177	22	167	21	332	42	211	27	75	10
NUMBER AND PERCENT WITH DYSMENORRHEA IN EACH GROUP			16	44	76	42	188	48	88	50	73	44	139	42	117	33	39	52

1928	NUMBER OF CASES STUDIED	PERCENT WITH DYSMENORRHEA	POSTURE								MUSCLE TONE							
			EXCELLENT		GOOD		FAIR		POOR		EXCELLENT		GOOD		FAIR		POOR	
			NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
	627	21	40	6	245	39	292	47	52	8	169	27	336	54	115	18	7	1
NUMBER AND PERCENT WITH DYSMENORRHEA IN EACH GROUP			9	23	50	21	62	21	14	27	23	14	70	21	39	34	3	43

ent organs. This tone, though dependent upon many factors such as nutrition, fatigue, etc., is more basic and fundamental in a study of this nature, than are the individual factors which influence the tone. In view of the confusion that exists regarding this term, it seems wise to use it only in its broadest sense, as indicating *readiness to act*. That the tone of the skeletal muscles indicates the tone of the hollow viscera of the body is borne out by abundant clinical evidence. The relation between muscle tone and dysmenorrhea is revealed by examination of the two principal groups in this study. (See Table IX).

TABLE IX

RELATION BETWEEN DYSMENORRHEA, POSTURE AND MUSCLE TONE IN IOWA AND WELLESLEY GROUPS

IOWA	POSTURE				MUSCLE TONE			
	EXCELLENT	GOOD	FAIR	POOR	EXCELLENT	GOOD	FAIR	POOR
	PERCENT				PERCENT			
1927	36	39	37	45	22	33	45	45
1928	24	31	30	39	22	30	37	0

WELLESLEY	POSTURE				MUSCLE TONE			
	EXCELLENT	GOOD	FAIR	POOR	EXCELLENT	GOOD	FAIR	POOR
	PERCENT				PERCENT			
1927	100	48	32	33	45	50	73	83
1928	0	17	19	0	13	18	30	0

The muscle tone in the original study of the Iowa group was determined largely from the silhouettes, an obviously unsatisfactory method. In the Wellesley group, on the other hand, the determinations were made by an experienced person, by actual observation and study of each individual. The relationship between posture, muscle tone, and dysmenorrhea in the combined groups is shown in Table VIII.

Relative Value of Posture and Muscle Tone: In view of the indefinite status of muscle tone, comparison of posture and muscle tone as indicators of physical health is unwise. Good posture generally indicates good muscle tone but the reverse is not always true. We are not entirely satisfied that so-called excellent posture is desirable or even normal. Certainly it is a temporary condition. Constant maintenance of such posture, is, in our opinion, not only unnatural but definitely tiring. On the other hand, according to our conception of muscle tone, we are dealing with a natural phenomenon, and one which indicates the normal and usual status of the individual. Until more definite evidence is available, however, any attempt at comparison is essentially a waste of time.

Relation between Lumbar Index and Dysmenorrhea: In earlier studies the angle of pelvic inclination appeared to bear some relationship to certain malpositions of the uterus. Thinking that some such relationship might also be found to exist in connection with other common gynecological conditions, the pelvic tilt was roughly determined by measuring the depth of the lumbar curve (lumbar index). The results, however, indicated no relationship between the lumbar index, or more specifically, the pelvic tilt, and dysmenorrhea.

Possible Explanation of Dysmenorrhea: As previously mentioned there are may causes for dysmenorrhea, but in most instances no definite lesion can be found to account for the condition. From time to time congestion has been mentioned as a possible basis for these unexplained cases. Observers in general, and physicians in particular, have been wont to accept this explanation with considerable reluctance, feeling that the underlying facts must be more intricate and complex. We feel that there is considerable evidence supporting the idea that congestion may be a cause of dysmenorrhea. It is well known that the blood vessels of the pelvic organs, particularly those of the uterus, are very thin walled. The veins in this region and those into which they drain, are, as a rule, devoid of valves, and form a most intricate and complex network known as plexuses. These include the bladder plexus, the vaginal and cervical plexus, the hemorrhoidal plexus, and the pampiniform plexus. Thus in individuals with poor tone, as revealed by reduction in the size of the thoracic cage, narrowing of the costal angle, lowering of the diaphragm, relaxation of the abdominal wall and tendency to ptosis of the abdominal organs,

there is loss of tone and synchronous relaxation of the blood vascular system as well. With the loss of tone, the complex vascular system of the pelvis undergoes dilatation, permitting congestion or the accumulation of venous blood in this dependent portion of the body. Under these conditions and particularly with the stress and strain of modern living, it is not difficult to conceive a state of chronic pelvic congestion existing in these individuals. These same women often have varices of the lower limbs. That this does not occur more frequently can be explained on the basis of the support derived from the surrounding muscular structures as well as on the basis of the valves which are known to exist in these veins. This question of pelvic congestion has been discussed in more detail in an earlier work. (7).

Before attempting to implicate pelvic congestion further as a cause of dysmenorrhea let us consider certain well established facts regarding the normal physiological processes of menstruation. It has been shown that the menstrual cycle is divisible into four fairly definite periods or stages. The *congestive stage* lasts about seven or eight days. During this time the mucous membrane of the uterine cavity undergoes marked hypertropby. The endometrium becomes markedly congested and edematous. This hyperemia continues to increase until finally, infiltration of blood into the tissues of the endometrium occurs. This marks the beginning of the *desquamative stage.* The surface epithelium loses its vitality and the cells thus discarded, together with blood and mucus, are discharged as the menstrual flow. According to more recent views, the desquamative stage is thought to be complete by the end of the second day of the flow. As shown in Table VII the pain of menstruation corresponds with this period of extreme congestion and desquamation. Immediately following the desquamative stage, regeneration of the lining mucous membrane of the uterus begins. This is known as the *regenerative stage* and is thought to be complete in two to four days or by the end of the flow. The *resting stage* occupies the period between the regenerative and next congestive period, a matter of ten days to two weeks. From consideration of the simple facts here presented, the tendency for pain or discomfort to begin a few days before or with the onset of the flow, gradually increasing in severity as the congestive stage reaches its peak, then disappearing as desquamation is complete, strongly suggests a cause and effect relationship. The normal physiological congestion of menstruation when superimposed upon the congestion already existing in the pelvic organs, being, in fact, the cause of the discomfort. This relationship seems all the more likely when we realize that the hyperemia incident to the congestive stage of the menstrual cycle is not alone confined to the uterus but involves the other pelvic organs. On this basis of poor muscle tone with re-

sulting congestion, the increased tendency to dysmenorrhea in tired or exhausted individuals is readily explained, since it is well known that fatigue definitely decreases the muscle tone. Likewise activity at this time, if not fatiguing, should be beneficial in that it improves the circulation and thus tends to lessen the congestion of these organs.

The explanation of obstructive dysmenorrhea may well be sought here. For years this type of dysmenorrhea has been forced into the background on the assumption that it was based upon unsound principles. Yet today we find many of the best gynecologists in this country and Europe dilating or incising the cervix for this very condition, and in many instances with good results (1). May it not be that the obstruction in these small underdeveloped, anteflexed uteri is due to the edema and swelling of the endometrium incident to the congestive stage of the menstrual period?

No discussion of dysmenorrhea can be considered complete without consideration of the nervous factor. Obviously, the part played by this factor is exceedingly difficult to determine. The impression generally held is that nervousness tends to increase the frequency of menstrual pain, yet, if that be so, how can we explain the marked reduction in the incidence of dysmenorrhea in a period of less than one year, under conditions which are admittedly favorable to increased nervousness. The alarm-clock existence, irregular hours, tension of study and examinations can scarcely be considered soothing to the nervous system. If, as we have assumed in this study, muscle tone is the important factor in explaining these uncomplicated cases, then the answer to this apparent paradox may be quite simple for it is definitely known that the muscle tone of high-strung, nervous individuals is better than in the phlegmatic type. Is it not possible then, that increased nervousness acts beneficially by improving the muscle tone, and in that way decreases rather than increases, the tendency to dysmenorrhea?

Obviously the data available from this study are insufficient to permit conclusions. It is hoped, however, that the findings will prove sufficiently interesting to stimulate others, and so, in the end, hasten the solution of another human riddle. If this report does that much, it will amply have accomplished its purpose.

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Part III

Book Reviews

THE HUMAN MECHANISM. By Theodore Hough, W. T. Sedgewick, and J. A. Waddell. Second Revised Edition. $3.00. Ginn and Company.

Better illustrations and an improved typography characterize this edition of an old favorite among textbooks in physiology and hygiene. Dr. Waddell's contribution is additionally observed in the incorporation of those advances in these subjects and in public health which are directly applicable to the purposes of the text, and by changes made in the interest of greater simplicity and clearness of presentation. One could wish that many other texts would adopt as have these authors the device of numbering the paragraphs as an aid in making accurate assignments to students. I consider this text excellent for these courses in physiology and hygiene which are given in the first year of a liberal arts college while teachers' colleges desiring to give a content course in this field will find it superior for that purpose.

N. M. Grier, Ph.D.

Department of Zoology, Evansville College, Evansville, Indiana.

PUBLIC HEALTH AND HYGIENE. *By* Charles Frederick Balduan, M.D. W. B. Saunders Co. Illustrated. 304 p.

The wide training and experience of the author in the administration and teaching of Public Health has permitted a more direct application of data to practice than has generally been the case in books that have flooded the market in this subject during the past few years.

So many subjects are covered that the book becomes sketchy in parts—in places merely an enumeration of facts. An attempt is made to cover too much of the field of Public Health in limited space available in a short treatise. The material is well selected and includes recent data.

The book is divided into five divisions: Introductory; Important Communicable Diseases; Other Important Preventable Diseases and Conditions; Community Hygiene; and The Prevalence of Disease Generally.

An historical background is included which contains many omissions, due, no doubt, to the size of the manual. The controversial subject of the first to use ether as an anesthesia and the performance of the first operation under ether without reference to the fact that the matter of the precedence is under question is to be regretted.

The book will serve as a splendid guide for beginning students in this work, and would make a splendid textbook. It is well bound, printed on good paper, copiously illustrated. The colored plates are much better than the black.

It can be recommended as well above average for the purpose it was designed. In general, it is scientifically sound and sufficiently non-technical to interest the layman.

Clair V. Langton, D.P.H., Dean

School of Health and Physical Education, Oregon State College, Corvallis, Oregon.

REFLEX ACTION. A study in the History of Physiological Psychology. Franklin Fearing. Williams and Wilkins Company, Baltimore. 1930. XIV-350 pages. $6.50.

Dr. Fearing has given us a comprehensive historical survey of the various theories of the nature of reflex action and of the numerous experiments which led to new theories or to the modification of the old. It is wide in its scope, including such topics as the nature of the nerve current, the nature of hypnotism, and dissociation, as well as the topics more closely related to the reflex arc concept. The controversy between the mechanists and vitalists receives a great deal of attention throughout the book.

He divides the development of the reflex concept into five periods, as follows.

(1) The pre-scientific period, beginning with the work of the early Greeks. (2) The speculative period (1650-1750), beginning with Descartes. (3) The period of nascent experimentation (1750-1831), beginning with Whytt. (4) The period of increased knowledge of the structural components of the reflex arc (1832-1906), beginning with the work of Sir Charles Bell and Marshall Hall. (5) The modern period, beginning with the appearance in 1906 of Sherrington's book on "The Integrative Action of the Nervous System." The discussion of the modern period includes five chapters with the following titles: The Inhibition of Reflex Action, The Reflex Maintenance of Posture, Motor Automatisms and Reflex Action, The Tendon Reflexes, and Modern Concepts.

The treatment is characterized by (a) the so-called "pure science" attitude of the author, and (b) by his interest in the mechanist-vitalist controversy. In the Preface he says: "The stimulus-response formula embodied in the reflex is suited admirably to the interpretation of the simpler forms of behavior, as shown, for example, by the artificially isolated spinal segments in the experimental animal. In spite of its apparent simplicity and adequacy, certain difficulties and obscurities have appeared in the application of this principle to the complex behavior patterns of the intact animal." He believes that the time has come when we need a critical "re-examination of all the phenomena on which such a concept must rest."

The author has made no attempt to apply any of the various principles to every-day life, to the acquisition of skill, or to athletic performance.

There are 554 titles in the bibliography.

C. H. Griffitts,
Associate Professor of Psychology
University of Michigan

CAMPING AND EDUCATION. By Bernard S. Mason, Department of Sociology, Ohio State University. With a Foreword by Elbert K. Fretwell, Professor of Education, Teachers College, Columbia University. The McCall Company, New York. 300 pages. Cloth. $3.00.

This book is the winner of the prize competition sponsored by the Department of Education of the Redbook Magazine, for a "constructive and creative contribution to the theory and practice of organized camping."

The scope of the work is well stated in the sub-title, "Camp Problems from the Campers' Viewpoint."

The method used in preparing the material is unique, in that instead of approaching the problem with pre-conceived adult ideas of what will appeal to boys and girls, the author has attempted to determine the typical camper-reactions to certain phases of the program and management of the modern organized summer camp, and to discover, if possible, to what extent the tactics used are satisfying to the camper-aim.

A departure from the conventional method of gathering such material was the use of the "personal interview," rather than the questionnaire type of investigation. In dealing with boys and girls this has obvious advantages.

The author concerned himself with four main aspects of camp administration.

First: To determine the effects of the organized camp upon character and personality insofar as such effects can be obtained from the campers themselves.

Second: To secure the boy and girl reactions to camp leadership, its type, age and qualifications.

Third: To obtain the campers' reactions as to the extent to which it is wise to schedule the time of the campers, and to what extent they should be entirely free to do as they choose.

Fourth: What is the relative popularity and importance of the various activities which are or may be included in a camp program.

Every camp director will recognize these as basic problems in building a program which will be satisfying to campers in their universally expressed aim of pleasure and interest, or "fun," in the words of the campers themselves, which will at the same time make for the building of character and the moulding of personality.

The author summarizes the results of his findings on such points as:

Popular and unpopular traits of campers: the camper's estimate of the effect of various types of punishment: what changes would you make if you were running the camp? popularity of various camp activities: what activities would you like to have your camp add to its program? what things about the camp did you like least? what things about your counselors did you like best? what things about them did you like least?

A well selected bibliography of over three hundred titles adds greatly to the value of this work.

The book should appeal to every camp director who is realizing his responsibility in the development of an educational-recreational project.

It is to be commended as an original and worthwhile contribution to the growing body of literature on organized camping.

P. B. Samson,
Professor of Physical Education,
President, The Great Lakes Inter-Camp Council
Ypsilanti, Michigan

EDUCATION AND THE SUMMER CAMP. An experiment. By Lloyd Burgess Sharp, Teachers College, Columbia University Contribution to Education, No. 390.

In this very readable account of a four year program in the camps sponsored by Life's Fresh Air Fund, Dr. Sharp gives a detailed report of the plans, methods of organization, and administration which were followed under his directorship from 1925-1929.

A brief introduction followed by a history of the development of camping as a part of Welfare Work in New York City orients the reader to the present problem. This problem, briefly stated, is to put on the educational basis made possible by the camp situation, a program which had formerly been directed with the simple purpose of outdoor relief. A survey made in 1925 by a committee on vacation camps of the Children's Welfare Foundation disclosed the fact that most of the camps needed to give more attention to such important items as a planned recreation program, nature study, service of a trained dietitian, weighing children before and after the camp period, showers, night supervision, etc. Improvement in these items as well as many others was shown by subsequent surveys in 1926 and 1927.

Before outlining the program in the two camps supported by Life's Fresh Air Fund (Camp Raritan for boys near Potterville, N. J. and the Camp for Girls at Branchville, Connecticut) Dr. Sharp considers the educational opportunities offered by Camp Life. He sets up objectives in terms of modern educational philosophy, quoting from Dewey, Kilpatrick, Bonser, Williams and the seven Cardinal Principles, as well as the special list of objectives set up by the New York Section of the Camp Directors Association. No quantitative analysis nor attempt at a summary is made.

The principles guiding selection of activity are adapted from a list by McMurry in an article in the "Making of School Curricula" and another list by the staff of the Lincoln School. In an excellent discussion of camp life as a field for learning, Dr. Sharp points out the fact that in providing real life situations, in demanding resourcefulness, in offering projects and giving time for carrying them through, in complete participation, camp is superior to school. The actual number of waking hours spent by a child who comes to camp for two weeks is 1-5 that of the total for the school year. A four weeks period gives 2-5 and nine weeks a little over 9-10 as much time as school. No wonder parents as well as camp directors are becoming more critical of the way these valuable hours are spent.

The program is outlined in detail in only two activities: swimming and nature study. The reader is left to wonder in regard to a number of problems which are significant in organization camps as well as private camps; i.e., competition, awards, scheduling and the like. The general tone of the report would indicate that the more progressive policy of freedom, flexibility, and purposeful rather than motivated activity has been followed.

The chapter on outcomes gives a mass of detail in regard to menus used, finance plans, health policy, counselor turnover, and the like. This chapter is of more interest to the individuals responsible for

this particular project than to the reader interested in education or camping in general. There is no attempt to show quantitative results (except in counselor turnover). It is difficult to understand the omission of tables showing weight changes during the camp period. The records were kept, and elsewhere in the report Dr. Sharp mentioned the importance of weight data as an index of health.

On the whole, the report will be of interest to all members of the profession of Physical Education who are awake to the educational possibilities of camping. However, it does not offer what we might expect from a doctor's thesis published under the title of an experiment. That is, it does not give definite quantitative results from a controlled investigation.

Elizabeth Halsey,
University of Iowa

THE PHYSICAL WELFARE OF THE SCHOOL CHILD. By Charles H. Keene. Pages xi, plus 505. Houghton, Mifflin Company. New York. 1929.

The scope of this book is indicated by its title. It is a textbook in school hygiene and health and is planned for students of normal schools and colleges. The part of the book concerned with the school health program, the health supervision and general administration is an excellent presentation of modern methods in this field. The matter presented is rather concentrated but each chapter is followed by a sufficient number of selected references to enable the student to fill in the gaps. Throughout the book one finds rather good historical reviews of the development of the science up to the present.

The presentation of physical education will be somewhat disappointing to devotees of the more natural programs. There is somewhat of an assumption that the main difference between the advocate of the natural program and that of the formal program is that the latter is better trained. This is hardly fair to the proponents of the more natural systems.

This part of the book somewhat overstresses the theory of recapitulation which in its poorer forms at least has been rather adequately exploded. Neither is there any discussion of the project approach in the teaching of physical education.

The section given over to mental hygiene is a bit weak in so far as it stresses primarily the medical side and gives very little from the standpoint of the mental adjustment contributed by the psychologist. The book on the whole is well worth reading and is perhaps all the more stimulating because of the fact that one will disagree with a number of the theories proposed.

C. H. McCloy,
University of Iowa.

CHARACTER EDUCATION ON A PRACTICABLE BASIS. By Mrs. Agnes Boysen. F. E. Compton & Co., Chicago. Pp. vi plus 34. 1929.

This little book is a striking contrast to the current character education tests in that it proposes an attack upon the problem of character building through the direct method. Students are given a small manual which was developed by the students themselves and in which certain traits are pointed out. The student is then pressed to endeavor to develop a behavior in accordance with these traits which he is taught to accept as desirable. The work of the school is organized around this program.

This sort of methodological approach is not the one approved by the majority of the proponents of character education. It has, however, worked in the school in which it was developed. This simple enthusiastic account of a system which has been successful will be stimulating to those who would experiment with the direct approach.

C. H. McCloy,
University of Iowa.

PERSONAL HYGIENE FOR NURSES. By Seneca Egbert, M. D., D. P. H. F. A. Davis and Company, Publishers. Philadelphia, Pennsylvania.

From a background of a rich experience as a teacher in College and University and a lecturer in two large Schools of Nursing, Dr. Seneca Egbert has written

an excellent text, "Personal Hygiene for Nurses." The volume is well planned in content, clear in style, and told in an interesting manner. The chapters deal with health, how it may be attained and preserved. Following each chapter is found a list of carefully selected reference books. There are questions on each subject in the text which encourage the student nurse to apply the knowledge to her daily life in the hospital. The author stresses the application of healthful habits in right living. In the first part of the book is found an illustration of the personal health record card used by student nurses at the Philadelphia General Hospital. The chapters on Personality, Posture, and the Nervous System cannot fail to hold the reader's interest.

The text is up to date, concise, and direct in dealing with the main factors of health. It belongs in the well-appointed library of a school of nursing. The book is admirably printed, with thirteen chapters, and contains twenty-nine illustrations. A carefully selected bibliography and index complete the volume. Undoubtedly it could be used in classes on Personal Hygiene of Junior Colleges as well as in Schools of Nursing.

Barbara H. Bartlett,
Professor of Public Health Nursing,
University of Michigan

ASSEMBLIES FOR JUNIOR AND SENIOR HIGH SCHOOLS. By Eileen H. Galvin and M. Eugenia Walker. 334 pp. Professional and Technical Press, New York, 1929.

The movement to incorporate the extra-curricular activities into the educational program of the high school has turned the attention of school men to activities hitherto disregarded and has given an entirely different aspect to familiar institutions. Nowhere is this change in point of view more evident than in the assembly program of a modern school. Successor to the "chapel exercise" of an earlier day, it bears little relation to its predecessor.

In the older type of exercise the emphasis was on the platform where teacher authority presided and pupils formed a passive (and frequently apathetic) audience. The program was in the hands of adults and was largely routine, devotional, or exhortative.

The assembly "in the modern manner" is a student affair, guided by teachers to be sure, but planned, executed, and presided over by pupils, giving an outlet for pupil initiative and serving to integrate the school. Programs are the outcome of activities initiated by a class, a club, a home room.

This newer point of view of the place and function of the assembly in high school life is effectively presented by the authors of "Assemblies for Junior and Senior High Schools." The opening chapters on "Values of Assembly Programs" and "Administration of the Assembly" present a set of sound criteria for evaluating assembly programs and a technique for carrying them out. These chapters should be read by every teacher and principal responsible for the assembly policy of a school.

Succeeding chapters present concrete suggestions and illustrative programs in the various fields of subject matter—art, commercial fields, English, foreign languages, and so on. These chapters will be welcomed with special enthusiasm by workers in the field, eager for ideas which may mobilize a particular group of pupils into action on an assembly program. This section might have been improved by a more careful selection on the part of the authors of the programs to include, since not all those presented seem worth while in the light of the criteria outlined in the first chapter.

In the appendices various actual programs are reported in full, and sample semester schedules of assemblies are given. A bibliography of dramatics, with brief sections on one act plays, long plays for paid performance, and books on play production completes the volume.

The sound statement of underlying principles and the wealth of practical suggestions should recommend this book to high school teachers generally.

Edgar G. Johnston, Ph. D.
Principal of University High School,
University of Michigan.

THE SOCIAL WORKER: IN GROUP WORK. By Margaretta Williamson, New York. Harpers and Brothers, 1929. Pp. ix plus 241.

This survey is the Second Volume, Job Analysis Series of the American Association of Social Workers. It is written with an emphasis upon practical value and undoubtedly will be helpful to the "face to face" staff worker, the administrator and the board member.

The book gives a brief historical background with a statement of the objectives of various types of organizations, namely: settlements, community centers, school centers, church centers, Y.M.C.A., Y.W.C.A., Y.M. and Y.W.H.A., Boy Scouts of America, Girl Scouts, Inc., Camp Fire Girls, Boy's Clubs and playground and recreation systems. The scope of the study deals with between forty and fifty types of group work positions.

Three major subdivisions of workers are studied; the Group Worker, the Specialist, and the Executive. The author gives a comprehensive job analysis, showing the organization, the administration, the program and the duties of these workers in their special fields of service.

A very practical outline is presented with first hand materials gathered from interviews, actual observation of workers on the job, attendance at staff conferences, reading of reports and additional material selected from National organizations and schools offering social work. Supplementary data showing a "Specimen day" for many types of workers helps to make the various jobs realities and should be of service to persons seeking vocational guidance, for class room discussion and as a check for the workers themselves.

Suggestive and thought-provoking hints are offered on topics dealing with "Staff Training," "Members," "Committees" and "communities."

The study is rounded out with a discussion of the worker's education, experience, personality, compensation, hours of work, stimulation, professional advancement, vacations, turnover and personnel practices.

The book should have value for the training school in planning its curriculum, for groups in training, and it offers helpful suggestions to the personnel bureau. It will give a broadening insight into the other fellow's job and help us to see how each in his way is working toward the same general end.

The final impression which the book gives is its genuine practical usefulness.

A. S. Hotchkiss, Superintendent, Division of Physical Education and Athletics, Department of Social Science, Tennessee Coal, Iron & Railroad Company, Birmingham, Ala.

ENRICHED TEACHING OF PHYSICAL EDUCATION IN THE HIGH SCHOOL. By Woodring and Schwendener. Bureau of Publications, Teachers College, Columbia University. 139 pages.

A source book for teachers of Physical Education listing chiefly free and low cost illustrative and supplementary materials. Also of particular interest to camp counselors and recreation leaders. The authors in their preface state that no attempt has been made to cover the field of health education.

An annotated reference is given for apparel, athletics, camping, costumes, dancing, dramatics, equipment and supplies, excursions, festivals and pageants, first aid, health and hygiene, music, pictures, posters, charts and slides, professional reading, magazines and periodicals, recreation, summer activities for teachers, professional associations, tests and measurements. Prices are listed for all saleable materials. The compilers have consulted experienced teachers in compiling the lists in the book. The physical education teacher will find here a handy and reliable reference for many questions. It can be recommended as a very useful addition to the physical education library.

Elmer Mitchell,
University of Michigan

TRACK ATHLETICS AND CROSS COUNTRY. A Guide for the High School Coach and Contestant. By Lloyd W. Olds. A. S. Barnes & Co. 149 pages. $2.00.

This is the latest book on track athletics for men and it has been written pri-

marily for the aid of the coach in high schools. The author speaks from the experience of several years of successful coaching in this branch of sport. One of the features of the book is a section on cross country and this is almost the first to be written on this particular subject.

The book is put out in large type with wide margins which will permit the addition of notes by the coach. Possibly the one point that strikes the reader is that the material has been carefully sorted until only the main essentials have been retained. It is very evident that the author has striven to give a clear understanding of coaching technique for each event and has therefore omitted all detail in the way of historical treatment or narration of outstanding feats in the track world.

For class room use as a text, the teacher no doubt will find it desirable to amplify on the background of track as a sport throughout history.

The book is generously illustrated with pen sketches showing the proper form in all events.

Training methods, weekly and seasonal workout programs, and time schedules, particularly from the standpoint of the high school boy, complete this clearly explained and needed addition to the literature of track and field athletics.

Elmer Mitchell,
University of Michigan

BOYWAYS. LEAVES FROM A CAMP DIRECTOR'S DIARY. By A. E. Hamilton. John Day Co. 238 pages. $2.50.

The author of "Boyways" is well known as a sympathetic student and writer on boys and their problems. Of Mr. Hamilton it has been said, "he has more successfully turned the boy inside out than any author I have read." (Edward W. Bok).

This particular book deals with the psychology of the boy away from home. It shows how boys and their counselors meet situations both commonplace and unusual. The book departs entirely from the conventional textbook method, and the lessons it brings out are not thrust at the reader but are "caught" quite effectively and unobtrusively through the picturing of certain anecdotes and incidents of camping life. Although not pointed out directly, the lesson is there for the readers who can visualize the situation with imagination and analyze it with sympathetic insight.

No one passing through the pages of this book can doubt the author's love of boys, of camping, and of outdoor life in general. On the whole, it is a philosophical and spiritual treatment of the subject with which it deals. Yet at the same time practical bits of wisdom are constantly being sandwiched in between the descriptive passages and the camping anecdotes with which it is so brimful. The person planning to engage in camping work—or any kind of work with boys—would find this a most valuable supplement to the practical manuals he is so certain to consult—for in Mr. Hamilton's book he would catch the spirit of camping portrayed at its best and would have an approach to many situations which a mere exposition of facts could not possibly make clear to him. A short appendix does depart somewhat from the style of the previous pages in that it offers cautions and words of advice in the direct manner.

"Boyways" is not a book that must be saved until one has cornered himself for a period of serious study; it is interesting reading for relaxed armchair moments.

Elmer Mitchell,
University of Michigan

THE LITERATURE OF AMERICAN SCHOOL AND COLLEGE ATHLETICS. Bulletin Number Twenty-four. Carnegie Foundation, 522 Fifth Ave., New York City. No charge. By Professor W. Carson Ryan, Jr., of Swarthmore College, with Foreword by Dr. Henry S. Pritchett.

The Carnegie Foundation has done an immense service to the athletic profession in the compilation of the material found in this book. It brings together under one cover, all the important books and articles that have been written on this subject and makes brief summaries and critical comments upon them. The summaries of Professor Ryan's findings are grouped

under ten headings. In abbreviated form, these are:

1. "There is general acceptance of athletics as education." 2. Existing opposition to athletics is directed for the most part not at athletics *per se*, but rather at faulty administration of athletics. 3. "The educational institution must exert itself to administer athletics educationally, with adequate student responsibility but freedom from outside non-educational control. 4. The claim that athletics seriously interfere with scholarship apparently remains unproved. 5. As to health, college athletes are found to have better life-expectancy than the general population, but no better than the college population. 6. More athletics rather than less athletics is generally accepted as one of the remedies for athletic ills. 7. Coaches and athletic directors are regarded as highly important teachers of youth. 8. School athletics are held to be even more specifically educational than athletics at the college level. 9. Considerable difference of opinion prevails as to the desirability of inter-institutional athletic contests for girls and women, with a strong trend at present against such contests. 10. The ideal of sportsmanship is held aloft as one of the genuine values of school and college athletics.

To the student and to the teacher of courses dealing with athletics, this summary of all the significant printed opinion on athletics is invaluable. The book needs a place on the shelves of every athletic library. It is not controversial and is free from the fault finding attitude of Bulletin No. 23. Its emphasis, instead, is on an ideal of athletics and the reader's mind is not allowed to wander from this viewpoint.

Elmer Mitchell
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